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D I P L O M S K I R A D

ТЕМА : МОДЕЛОВАЊЕ УГЛЈЕН - ДИОКСИДНОГ LASERA

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Uvod

1916. godine A. Ajnštajn je teorijski predvideo postojanje stimulisane emisije. Međutim, prošlo je oko četrdeset godina do prve praktične realizacije kvantnog generatora poznatijeg pod imenom LASER od početnih slova engleskog naziva *Light Amplification by Stimulated Emision of Radiation*, što znači pojačanje svetlosti stimulisanom emisijom zračenja.

Prvi laser su konstruisali u periodu od 1954 - 1956 nezavisno jedni od drugih u SSSR-u Basov i Prohorov, i u SAD Tauns, Gordon, Cajger, Šimoda i Vang. Prvi laser je ustvari bio MASER (laser u mikrotalasnom opsegu) na bazi amonijaka, a prvi LASER (u vidljivom delu spektra) je konstruisao Mejman na bazi rubina ($\lambda = 690 \text{ nm}$).

Ugljen-dioksidni laser je konstruisao K. Patel 1964. godine ($\lambda = 10.6 \mu\text{m}$). Prvi CO_2 laser nije sadržavao ostale današnje komponente i imao je malu snagu i stepen korisnog dejstva.

Karakteristike CO_2 lasera su znatno poboljšali Konjuhov i Prohorov 1966. godine, dodajući u ugljen-dioksid azot.

1970. godine T. Gerry je objavio rad o prvom snažnom CO_2 laseru.

Danas postoje veoma snažni CO_2 laseri kao naprimjer u Los - Alamosu čija energija impulsa iznosi 100KJ za trajanje reda mikrosekunda, što daje snagu reda $10^{11} - 10^{12} \text{ W}$.

Laseri su našli veliku primenu u nauci, industriji, medicini itd. Evo nekoliko primera :

- u fizici se razvila laserska spektroskopija visoke moci razlaganja, kvantna elektronika, holografija

- u hemiji se ostvario postupak razdvajanja izotopa pomocu laserskog zračenja

Primena u medicini je još u početnoj fazi. Perspektive su velike jer laserski snop snage do 100W veoma uspešno seče tkivo ne oštećujući susedna tkiva.

Razna merenja (dužine, brzine itd.) kao i izrada etalona su ostvarena pomoću lasera zbog stabilne frekvencije zračenja. Ostvareni su optički sistemi za prenos informacija (telekomunikacioni optički sistemi), i optički sistemi za zapisivanje i čitanje informacija (optički čitači kodova, CD plejeri optički čitači diskova itd.).

Poseban interes postoji za CO_2 lasere u industriji zbog svojih dobrih osobina :

- 1) relativne jednostavnosti
- 2) cene
- 3) velikog stepena korisnog dejstva (kreće se do 30%)
- 4) velike energije i snage zračenja što omogućuje:

- varenje (do 10 m/min što je deset puta brže od klasičnog).
- rezanje kako metala, tako i nemetala
- površinsko poboljšavanje i legiranje
- obrada keramike

Osim ovoga laka kontrola snage lasera čini ga prihvatljivijim u odnosu na neodimski ili rubinski laser.

Laseri velike snage kao onaj u Los-Alamoskoj laboratoriji koristi se u eksperimentima sa termonuklearnim reakcijama za dostizanje visokih temperatura neophodnih za početak fuzije.

Cilj ovog rada je da da matematički model CO_2 lasera kako bi se na osnovu zadatih veličina mogle predvideti karakteristike. Takav model omogućava da se projektovanje lasera traženih karakteristika svede na tehničke a ne na suštinske probleme. Nestali bi problemi oko "pogadanja" gabarita, pritis-

ka radne smeše i njenog sastava itd. Međutim, postoje još mnogi problemi koji moraju biti rešeni na kvantnom nivou ako želimo da što vernije modelujemo procese u laseru čime ćemo smanjiti greške u proračunima.

Ovaj rad ne zalazi u kvantomehaničke probleme, rešavanje Šredingerove jednačine pri sudarnim interakcijama, nego pokušava fenomenološki, a često i primenom empirijski dobijenih rezultata i formula da oformi matematički model.

Rad je podeljen na pet celina. U prvoj se daje opšti pogled na energetske nivoe kod molekula sa posebnim osvrtom na vibracione nivoe kod ugljen-dioksida.

Druge poglavlje je posvećeno objašnjenju električnog pobudivanja i to primenom dve suštinski različite metode.

Treći deo objašnjava ponašanje zračenja unutar laserskog rezonatora pri čemu je data jednačina koja opisuje vremensku evoluciju intenziteta zračenja.

Cetvrti deo je najobimniji i u njemu se objašnjavaju bazni kinematicki procesi u smeši $\text{CO}_2 - \text{N}_2 - \text{He} - \text{CO}$. Tu su formirane jednačine koje opisuju promene energija najvažnijih energetskih nivoa za rad lasera.

Peti deo se bavi matematičkim rešavanjem dobijenih jednačina. Opisana je metoda rešavanja, algoritam i na kraju sam program koji je namenjen za rad na PC računarima.

Program je testiran i provereno je se da li važi zakon održanja energije u granicama greške računanja jer se radi o numeričkoj metodi, ali i greške samog sistema jednačina, jer su uzeti u obzir samo dominantni procesi prilikom formiranja jednačina.

POGLAVLJE I

ENERGETSKI NIVOI

Energetski nivoi kod molekula bitno se razlikuju od energetskih nivoa kod atoma. Pre nego što opišemo en. nivoe kod CO₂ evo nekoliko reči uopšteno. Kod molekula postoje osim elektronskih, i oscilatorni i rotacioni en. nivoi.

ELEKTRONSKI en.nivoi su kao i kod atoma posledica kvantovanja energije atoma. Medutim, kod atoma u molekulu ti nivoi nemaju iste vrednosti kao kod usamljenih atoma jer dolazi do medusobnog uticaja atoma u molekulu i nivoi su perturbovani. Valja napomenuti da najveći uticaj trpe periferni nivoi, jer su elektoni na tim nivoima odgovorni za stvaranje veza u molekulu a i slabije su vezani od strane jezgra od unutrašnjih elektrona.

OSCILATORNI en. nivoi su posledica oscilovanja atoma oko ravnotežnog položaja u molekulu. Osc. nivoi su kvantovani kao i elektronski , a energija se izračunava kao:

$$E_{osc} = (v + \frac{1}{2})h\nu_0 ; \quad v=0,1,2,\dots \quad (1.1)$$

gde je v - oscilatorni kvantni broj

ν_0 - frekvencija oscilovanja

Za oscilatorne prelaze promene oscilatornog kvantnog broja mogu biti:

$$v = \pm 1, \pm 2, \dots$$

ROTACIONI en. nivoi su rezultat rotacije molekula oko centra masa.I ova energija je kvantovana, a izraz za nju je dat kao:

$$E_{rot} = J(J+1) \frac{h^2}{8\pi^2 I} ; \quad J=0,1,2,\dots \quad (1.2)$$



Poglavlje I : Energetski nivoi

gde je J-rotacioni kvantni broj, a

I-moment inercije molekula u odnosu na centar rotacije
Kod rotacionih energetskih prelaza važi strogo pravilo da se
rot. kvantni broj J može menjati samo u granicama:

$$\Delta J = \pm 1$$

Ako uporedimo vrednost elektronske, oscilatorne i rotacione energije dobijamo:

$$\begin{array}{ccc} E & \gg & E \\ \text{el} & & \text{osc} & & \text{rot} \end{array}$$

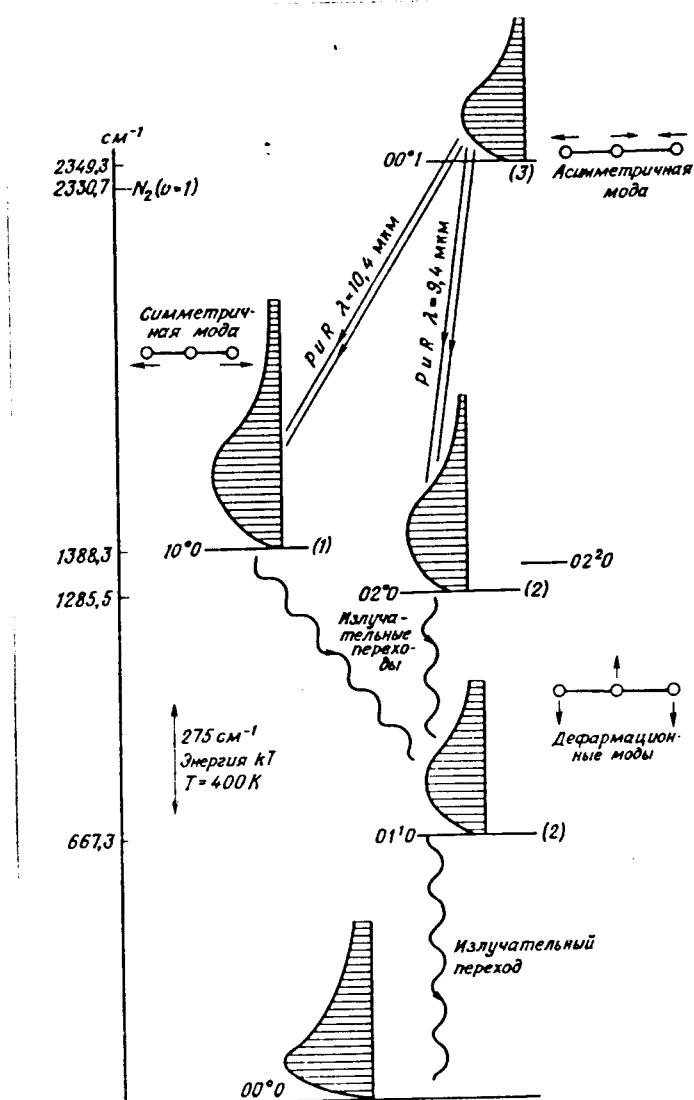
To znači da svaki elektronski nivo sadrži mnoštvo oscilatornih nivoa, a ovi sa svoje strane sadrže mnoštvo rotacionih nivoa. Zbog toga molekulski spektri nisu linijski, već trakasti. U svakom prelazu učestvuju rotacioni nivoi jer izborni pravilo $\Delta J = \pm 1$ ne dozvoljava prelaze $J' = J''$. Čisti rotacioni prelazi su mogući kod molekula koji poseduju značajniji dipolni momenat.

Rad ugljen-dioksidnog lasera se zasniva na oscilatorno-rotacionim prelazima.

Molekul CO_2 je linearan i ne poseduje stalni dipolni moment.



Znamo da svaki sistem od N čestica poseduje $3N$ stepeni slobode. Znači, molekul CO_2 ima devet stepeni slobode. Međutim, pošto je to vezan sistem tri stepena se troše na translaciju centra masa, dva na rotaciju molekula oko atoma ugljenika (rotacija molekula duž njegove ose ne predstavlja novi stepen slobode), a preostala četiri predstavljaju moguće oscilacije atoma oko ravnotežnih položaja. Upravo oscilatorni stepeni slobode su bitni za rad CO_2 lasera.

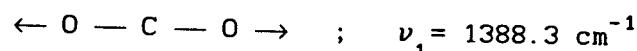


Slika 1. Prikazana je termska Šema oscilatornih nivoa CO_2 bitnih za rad lasersa. Najvažniji laserski prelazi su obeleženi. Horizontalnim linijama je naznačeno postojanje mnoštva rotacionih nivoa unutar svakog oscilatornog. Na Y-osi obeležene su vrednosti talasnih brojeva za svaki vibracioni mod. Такође је означен и vibracioni nivo ($v = 1$) molekula N_2 jer predstavlja "rezervoar" energije u procesu pobude lasersa

Poglavlje I : Energetski nivoi

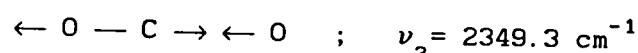
MODE (načini) oscilovanja su sledeći:

a) SIMETRIČNI MOD



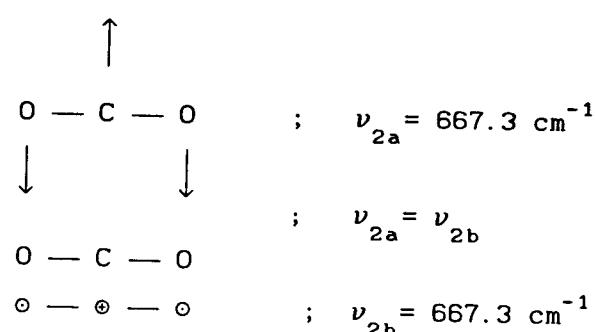
ν_1 - karakteristična frekvencija oscilovanja

b) ASIMETRIČNI MOD



ν_3 - karakteristična frekvencija oscilovanja

c) DEFORMACIONI MOD, koji je dvostruko degenerisan



ν_{2a} , ν_{2b} - karakteristične frekvencije oscilovanja

Oscilovanje molekula CO_2 karakterišemo sa tri kvantna broja:

$$(\nu_1, \nu_2^\ell, \nu_3)$$

ν_1 - kvantni broj simetričnog moda

ν_2^ℓ - kvantni broj deformacionog moda, pri čemu indeks ℓ određuje vrednost momenta impulsa $\bar{M}_p = \hbar\ell$, koji se javlja duž ose molekula , i poprima vrednosti :

-za parno ν $\ell = \nu, \nu-2, \dots, 0$

-za neparno ν $\ell = \nu, \nu-2, \dots, 1$

ν_3 - kvantni broj asimetričnog moda

Poglavlje I : Energetski nivoi

Spektar molekula CO_2 je kombinacija oscilatorno - rotacionih linija.

Razlikujemo :

P - granu. Kod ovih vibracionih prelaza se rotacioni kvantni broj J povećava za 1, tj. $J_2 = J_1 + 1$.

R - granu. Kod ovih vibracionih prelaza se rotacioni kvantni broj J smanjuje za 1, tj. $J_2 = J_1 - 1$.

Linije kod kojih se J ne menja su veoma retke i nemaju značaj za rad ugljjen-dioksidnog lasera (tzv. Q - grana).

Najvažniji laserski prelaz (Sl.1) je između nivoa :

$$(00^01) \rightarrow (10^00) \quad \lambda = 10,4 \mu\text{m}$$

tj. između asimetričnog valentnog, i simetričnog valentnog.

Pri tome se javlja trakasti spektar sa dominantnom linijom koja potiče od rotacionog prelaza $20 \rightarrow 21$.

Značajan je i prelaz (Sl.1) :

$$(00^01) \rightarrow (02^00) \quad \lambda = 9,4 \mu\text{m}$$

Ostali prelazi kojih ima nekoliko desetina, slabog su intenziteta, i nemaju praktični značaj.

Ukupna vibraciona energija molekula CO_2 je data kao :

$$E(v_1, v_{2a}, v_{2b}, v_3) = h\nu_1(v_1 + \frac{1}{2}) + h\nu_{2a}(v_{2a} + \frac{1}{2}) + h\nu_{2b}(v_{2b} + \frac{1}{2}) + h\nu_3(v_3 + \frac{1}{2}) \quad (1.3)$$

Ravnotežna naseljenost nivoa npr. v_1 sa stepenom degeneracije g_{v1} je data kao :

$$N_{v1} = \frac{N g_{v1} \exp(-v_1 h\nu_1 / kT)}{\sum_{v1=0}^{\infty} g_{v1} \exp(-v_1 h\nu_1 / kT)} \quad (1.4)$$

gde je N - ukupan broj molekula ugljen-dioksida ili uopšteno za tri vibraciona nivoa (jedn. 1.5) :

Poglavlje I : Energetski nivoi

$$N_{v_1 v_2 v_3} = \frac{N g_{v_1} g_{v_2} g_{v_3} \exp[-h(v_1 v_1 + v_2 v_2 + v_3 v_3)/kT]}{\sum_{v_1} \sum_{v_2} \sum_{v_3} g_{v_1} g_{v_2} g_{v_3} \exp[-h(v_1 v_1 + v_2 v_2 + v_3 v_3)/kT]}$$

U konkretnom slučaju, važnom za objašnjenje rada CO₂ lasera je $g_{v_1} = 1$, $g_{v_2} = (v_2 + 1)$, $g_{v_3} = 1$

Zamenom u uopšteni izraz dobija se posle transformisanja (jedn. 1.6) :

$$N_{v_1 v_2 v_3} = N \exp(-v_1 h\nu_1 / kT) \exp(-v_2 h\nu_2 / kT) \exp(-v_3 h\nu_3 / kT) \times \\ \times (v_2 + 1) [1 - \exp(-h\nu_1 / kT)] [1 - \exp(-h\nu_2 / kT)]^2 [1 - \exp(-h\nu_3 / kT)]$$

Ako se izvrši zamena :

$$Z = [1 - \exp(-h\nu_1 / kT)] [1 - \exp(-h\nu_2 / kT)]^2 [1 - \exp(-h\nu_3 / kT)], \quad (1.7)$$

može se napisati :

$$N_{001} = N_{CO_2} \exp(-h\nu_3 / kT) \cdot Z \quad (1.8)$$

$$N_{100} = N_{CO_2} \exp(-h\nu_1 / kT) \cdot Z \quad (1.9)$$

Energijski nivoi harmon. oscilatora dati su izrazom (1.1). Statistička suma za slučaj harmonijskog oscilatora kada se unutrašnja i spoljnja energija nalaze u stanju ravnoteže pri gasnoj temperaturi T* iznosi :

$$Z = \sum_{v=0}^{\infty} \exp\left(\frac{-E_v}{kT^*}\right) = \sum_v \exp\left(\frac{-(v + 1/2)h\nu}{kT^*}\right) \quad (1.10)$$

Transformacijom izraza (1.10) dobija se :

$$Z = \exp\left(\frac{-h\nu}{kT^*}\right) \left[1 - \exp\left(\frac{-h\nu}{kT^*}\right) \right] \quad (1.11)$$

Ukoliko u jedinici zapremine ima N oscilatora, onda je broj oscilatora u toj zapremini koji se nalaze u stanju sa kvant-

nim brojem v , pri ravnotežnoj gasnoj temperaturi T^* :

$$N_v = N_v(T^*) = N \frac{\exp\left[(-v + 1/2)(hv/kT^*)\right]}{z} \quad (1.12)$$

Ukupna unutrašnja vibraciona energija u jedinici zapremine pri temperaturi T^* iznosi :

$$E(T^*) = \sum (v + \frac{1}{2})hv \cdot N_v(T^*) \quad (1.13)$$

Zamenom izraza (1.12) u jednačinu (1.13) dobija se :

$$E(T^*) = \frac{1}{2} Nh\nu + Nh\nu \left[\exp\left(\frac{hv}{kT^*}\right) - 1 \right]^{-1} \quad (1.14)$$

Drugi član u jednačini (1.14):

$$\varepsilon = Nh\nu \left[\exp\left(\frac{hv}{kT^*}\right) - 1 \right]^{-1} \quad (1.15)$$

predstavlja unutarnju (vibracionu sa frekvencijom v) energiju jedinice zapremine gase, koji se nalazi u termodinamičkoj ravnoteži pri temperaturi T^* . Ovo se može upotrebiti za određivanje efektivne vibracione temperature. Ako sa E_a označimo vrednost unutrašnje energije, onda je efektivna vibraciona temperatura koja odgovara ovoj energiji jednaka :

$$T_a = \frac{hv/k}{\log(Nh\nu/E_a + 1)} \quad (1.16)$$

Ovo su uvodna razmatranja, a sada će biti reći o konkretnom problemu - modeliranju rada ugljen-dioksidnog lasera sa razmatranjem osnovnih procesa u radnoj smeši koju kod vecine lasersa čine tri gasea :

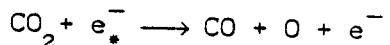
- 1) CO_2 ugljen-dioksid,

2) N₂ azot i

3) He helijum

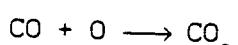
u razlicitim odnosima, koji zavise od pritiska smese i karakteristika koje se žele postići. Takođe se dodaje i vodena para u tragovima.

U toku rada lasera jedan deo molekula CO₂ disosuje po semi :



t.j. pod dejstvom elektrona.

Pretpostavlja se da je faktor disocijacije konstantan, jer se uspostavlja ravnoteža između disocijacije i spajanja molekula



Najpre ćemo razmotriti način pobudivanja CO₂ lasera.

POGLAVLJE 11

POBUDA

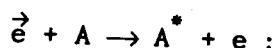
Pod pobudom podrazumevamo proces stvaranja inverzne naseljenosti u aktivnoj sredini lasera. Razradeno je više metoda od kojih su najpoznatije :

- pobudivanje optičkim putem
- električno pobudivanje
- termičko pobudivanje.

Najinteresantniji je drugi metod zbog efikasnosti i relativno jednostavnog tehničkog izvedenja. Električno pobudivanje je osnovni postupak iniciranja poluprovodničkih i gasnih lasera. Kod gasnih lasera se pobuda svodi na električno pražnjenje kroz gas .

MEHANIZAM ELEKTOPOBUDE KOD GASNIH LASERA

Sudari prve vrste. Pod ovim pojmom podrazumevamo neelastičan sudar elektron-atom pri kojem se kinetička energija elektrona transformiše u energiju pobudenog stanja atoma. Šematski to izgleda ovako:



Vibracioni nivoi molekula N_2 , CO i CO_2 mogu se pobuditi elektronima male energije (reda od 1eV do 10eV). Takvi elektroni mogu se dobiti u laserskom rezonatoru na dva načina :

1) pomoću samostalnog električnog pražnjenja. Ovaj metod je uobičajen kod tzv. TEA lasera (*Transversely Excited Atmospheric*). Kod njih se pražnjenje vrši poprečno u odnosu na laserski razonator , a time se smanjuje radni napon na elektrodama , koji je ionako visok , zbog visokog pritiska radne smeše (od 0,1MPa do 10MPa) . Najčešće se vrši dodatna predjonizacija ultravioletnim zračenjem (100nm - 200nm) .

U električnom stubu između elektroda elektroni podležu određenoj raspodeli po energijama. Visokoenergetski (brzi) elek-

Poglavlje II : Pobuda

troni ne pobuduju radnu smešu , već vrše njenu dalju ionizaciju i obezbeđuju pražnjenje, a samim tim i stvaranje novih elektrona . Niskoenergetski elektroni kojih ima daleko manje pobuduju vibracione nivoe komponenata u smeši.

Ovakav metod ne primenjuje se tako često, jer postoji veliki problem optimizacije električnog polja E. Jako električno polje povećava stepen jonizacije, ali i broj visokoenergetskih elektrona tako da se smanjuje broj sporih elektrona potrebnih za pobudivanje.

Manes K.R. i Seguin H.J. daju empirijsku formulu elektronskog impulsa :

$$N_e(t) = N_o(1-e^{-t})e^{-t} \quad (2.1)$$

gde je t izraženo u μ s a vrednost N_o se bira tako da maksimalna vrednost iznosi oko 10^{12} elektron/cm³.

Izraz (2.1) ima maksimalnu vrednost pri $t = \ln(3/2)$

Odatle sledi $N_o = (27/4) \cdot N_e^{\max} \approx 7 \cdot 10^{12}$ elektron/cm³.

2) Pražnjenjem koje je upravljano elektronskim snopom. Laseri koji se pobuduju na ovakav način nazivaju se elektro-jonizacioni. Neophodna koncentracija elektrona postiže se ne na račun visokog napona, već injektovanjem elektronskog snopa visoke energije koji ionizuju gas. Istovremeno, električno polje ubrzava sekundarne elektrone nastale u procesu ionizacije do neophodnih niskih energija. Takvi elektroni su u stanju da pobuduju vibracione nivoe gasa. Ovakav način pobude ima značajnu prednost nad prvim, jer se može birati električno polje tako da se postignu najbolji rezultati.

Promena koncentracije elektrona $N_e(t)$ odredena je brzinom pojavljivanja sekundarnih elektrona i brzinom rekombinacije

Poglavlje II : Pobuda

i apsorpcije od strane zidova laserske cevi i neutralnih molekula.

Gubici zbog rekombinacije proporcionalni su kako gustini elektrona N_e , tako i gustini jonizovanih molekula N_i . Ako uzmemo da su molekuli jednostruko jonizovani (što je najčešći slučaj) možemo uzeti $N_e \approx N_i$.

Gubici zbog apsorpcije su proporcionalni sa N_e ako se uzme da je broj neutralnih molekula konstantan.

Harrach R.J. i Einwohner T.H. su dobili jednačinu koja opisuje sumarni efekat sva tri procesa. Jednačina glasi :

$$\frac{dN_e(t)}{dt} = S - \alpha \cdot N_e^2 - \beta \cdot N_e \quad (2.2)$$

gde je :

S - brzina obrazovanja sekundarnih elektrona (u $\text{cm}^{-3} \cdot \text{s}^{-1}$)

α - koeficijent rekombinacije (u $\text{cm}^3 \cdot \text{s}^{-1}$)

β - koeficijent apsorpcije (u s^{-1})

U jednačini (2.2) nisu uzeti u obzir efekti kao npr. difuzija i disocijacija molekula.

Najčešće, injektujući snop ima pravougaonu formu signala mikrosekundne dužine. Ako obeležimo sa t_e dužinu trajanja impulsa, i pretpostavimo da se S ne menja tokom trajanja impulsa tj. $S = \text{const}$ od $0 \leq t \leq t_e$, može se jednačina prointegriti, i dobijamo (jedn. 2.3) :

$$N_e(t; 0 \leq t \leq t_e) = 2S(\beta^2 + (\beta + 4\alpha S)^{1/2} \operatorname{cth}((\beta + 4\alpha S)^{1/2} t/2))^{-1}$$

Nakon prestanka injektovanja elektrona, $S = 0$, i integraljenjem jednačine (2.2) se dobija (jedn. 2.4) :

$$N_e(t; t \geq t_e) = N_e(t_e) \left\{ \left[\frac{\alpha N_e(t_e)}{\beta} + 1 \right] \exp[\beta(t - t_e)] - \frac{\alpha N_e(t_e)^{-1}}{\beta} \right\}$$

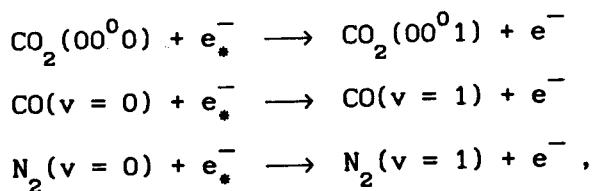
Poglavlje II : Pobuda

Ukoliko se pretpostavi da se proces apsorpcije može zanemariti u odnosu na rekombinaciju, onda je $\beta = 0$ pa rešenja dobijaju mnogo jednostavniji oblik :

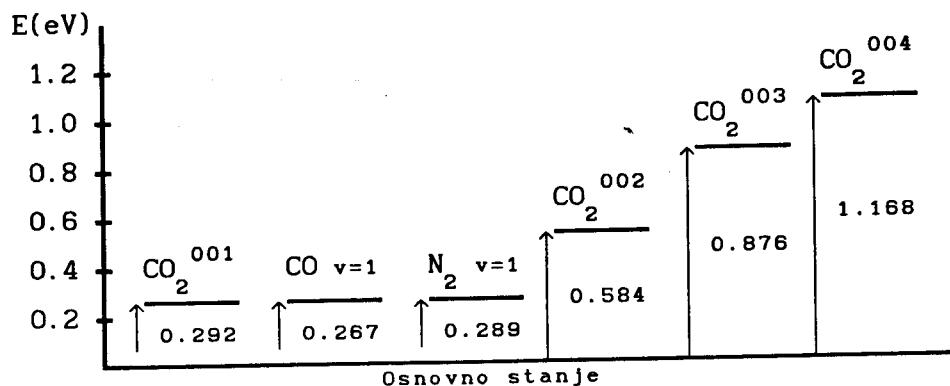
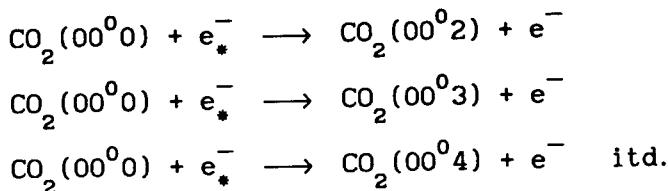
$$N_e(t; 0 \leq t_e \leq t) = (S/\alpha)^{1/2} \cdot \text{th}[(\alpha S)^{1/2} \cdot t] \quad (2.5)$$

$$N_e(t; t \geq t_e) = N_e(t_e) [\alpha N_e(t_e) \cdot (t - t_e) + 1]^{-1} \quad (2.6)$$

Rešenja opisuju promenu gustine sekundarnih elektrona za vreme i posle okončanja elektronskog impulsa pravougaone forme. Ovi elektroni interagujući sa molekulima najčešće dovode do sledećih procesa :



a nešto rede :



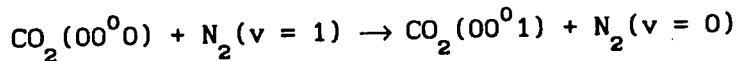
Slika 2. Prikazani su osnovni procesi pobudivanja. Označena energija (u eV) je potrebna za pobudu datih nivoa

Poglavlje II : Pobuda

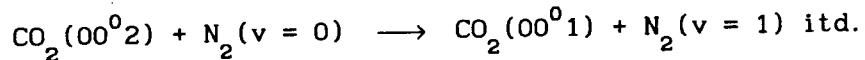
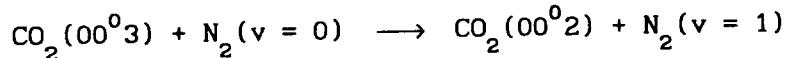
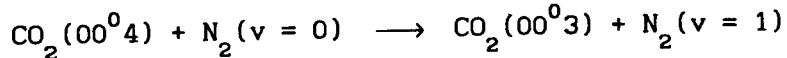
Osim sudarima prve vrste, molekuli CO_2 se pobuduju i suda-
rima druge vrste, tj. prenosom energije sa pobudenog na nepo-
buden atom (molekul) mehanizmom :



U konkretnom slučaju to je proces :



Sekundarni elektroni pobuduju i vibracione nivoe molekula N_2 prevodeći ih u stanje sa $v = 1$. Zahvaljujući slučajnosti da se energije nivoa (00^01) i $v = 1$ gotovo poklapaju, dolazi do rezonantnog prenosa energije sa molekula N_2 na molekul CO_2 . Ovo je veoma značajno jer je molekul azota bezdipolan, pa je vreme života na pobudnom nivou veliko (reda sekunda). Ta odlika čini azot izvrsnim "rezervoarom" energije za pobudu CO_2 . Treba naglasiti da je pobudivanje azota sekundarnim elektro-nima veoma efikasan proces. Takode su efikasni i procesi :



Svi ovi procesi vode povećanju naseljenosti nivoa (00^01), a time i inverzne naseljenosti.

Karakteristična veličina je brzina elektronsko-molekulske pobude, i označava se sa X_1 . U toku modelovanja jednačina uzima se $X_1 = \text{const}$, mada se u strogim proračunima mora uzeti u obzir zavisnost X_1 od temperature T, i električnog polja E po formuli :

$$X_1(T, E) = \int Q^1(\omega) \cdot f(\omega, T, E) \cdot \omega^3 \cdot d\omega$$

u kojoj su :

$$Q^1(\omega) = \sum_j \alpha_j \cdot Q_j^1(\omega)$$

$Q_j^1(\omega)$ - preseci za elektronsku pobudu molekula i-te vrste iz osnovnog stanja do j-tog vibracionog nivoa, i zavisni su od brzine elektrona. Izraženi su u cm^2 .

α_j - konstante proporcionalnosti izražene u $\text{eV}^{3/2} \cdot \text{cm}^{-3} \cdot \text{s}^3$.

$f(\omega, T, E)$ - funkcija raspodele elektrona po brzinama, koja zavisi od temperature smeše i postojeceg električnog polja, i izražava se u $\text{eV}^{-3/2}$.

Brzina elektronsko-molekularne pobude izražava se u $\text{cm}^3 \cdot \text{s}^{-1}$.

POGLAVLJE III

LASERSKO ZRAČENJE

Broj spontanih prelaza kuantnomehaničkog sistema sa višeg energetskog nivoa n na niži energetski nivo m u jedinici vremena putem emitovanja kvanata, naziva se brzina spontanih prelaza :

$$A_{nm} = \tau_{sp}^{-1} \quad (\text{s}^{-1}) \quad (3.1)$$

Ukoliko se emitovanje kvanata odigrava u prisustvu spoljnog zračenja, a i po fazi se podudaraju te dve emisije, onda se takva emisija naziva indukovana (stimulisana). Međutim, spoljno zračenje može i podizati kuantnomehanički sistem na viši nivo n . Indukovano zračenje se karakteriše Ajnštajnovim koeficijentima B_{nm} i B_{mn} , pri čemu prvi koeficijent opisuje prelaze sa višeg nivoa na niži, a drugi prelaze sa nižih nivoa na više u prisustvu spoljašnjeg zračenja. Veza između ova dva koeficijenta glasi :

$$\vartheta_n \cdot B_{nm} = \vartheta_m \cdot B_{mn} \quad (3.2)$$

gde je ϑ_i - stepen degeneracije i -tog nivoa, a koeficijenti B imaju dimenzije energija $^{-1} \times$ vreme $^{-2} \times$ dužina 3 .

Veza između koeficijenata A i B je data izrazom :

$$A_{nm} = \frac{8\pi h\nu^3}{c^3} B_{nm} \quad (3.3)$$

Moguće su dve forme predstavljanja koeficijenata B :

- 1) preko gustine energije zračenja (nju koristimo)
- 2) preko intenziteta zračenja pri čemu se koeficijenti označavaju sa B^1 .

Veza između B i B^1 glasi $B = (c / 4\pi)B^1$

Ako sa $N_{100}P(J+1)$ označimo broj molekula CO_2 na nižem nivou (simetrični mod), a sa $N_{001}P(J)$ broj molekula CO_2 na višem nivou (asimetrični mod) i ako je $\rho(\nu)$ - gustina zračenja tj.

POGLAVLJE III

LASERSKO ZRAČENJE

Broj spontanih prelaza kvantnomehaničkog sistema sa višeg energetskog nivoa n na niži energetski nivo m u jedinici vremena putem emitovanja kvanata, naziva se brzina spontanih prelaza :

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Uvedena je veličina I_ν koja predstavlja intenzitet zračenja i ima dimenzije energija \times dužina $^{-2}$ \times vreme $^{-1}$

$$c \rho(\nu) = I_\nu \delta(\nu - \nu_0) \quad (3.7)$$

Karakteristiku laserskog zračenja koje je gotovo monohromatsko karakteriše δ - funkcija Diraka. Ako se izraz (3.7) pro-integrali po svim frekvencijama dobija se :

$$\frac{\Delta N c^2 I_\nu_0 g(\nu_0)}{8\pi h\nu^2 \tau_{sp}} , \text{ a to predstavlja brzinu povećanja}$$

intenziteta zračenja tj. :

$$\left[\frac{dI_\nu_0}{dt} \right]_{poj} = \frac{\Delta N c^3 I_\nu_0 \nu_0 g(\nu_0)}{8\pi h\nu^2 \tau_{sp}} \quad (3.8)$$

Ukupno smanjenje intenziteta zračenja potiče uglavnom od :

- 1) transparencije, apsorpcije i rasejanja zračenja na ogledalima;
- 2) apsorpcije u aktivnoj sredini, jer realni sistem nije dvonivooski;
- 3) rasejanjem na optičkim nehomogenostima u pojačavačkoj sredini;
- 4) difrakcionim gubicima na ogledalima.

Svi gubici mogu biti opisani jednim parametrom - vremenom života fotona u laserskom rezonatoru τ_c . Drugačije rečeno veličina τ_c^{-1} predstavlja sumarnu brzinu gubitaka fotona u rezonatoru.

$$(dI / dt)_{gub} \approx I_\nu / \tau_c \quad (3.9)$$

Da bi laser mogao da radi, mora biti ispunjen uslov :

$$(dI / dt)_{poj} - (dI / dt)_{gub} \geq 0 \quad (3.10)$$

Uzimajući u obzir jednačine (3.8) i (3.9) dobija se :

$$\frac{\Delta N c^3 I_{\nu_0} \nu_0 g(\nu_0)}{8\pi h\nu^2 \tau_{sp}} - \frac{dI_{\nu_0}}{\tau_c} \geq 0 \quad (3.11)$$

Iz izraza (3.11) se može izračunati granična inverzna naseljenost koja iznosi :

$$\Delta N \geq \frac{8\pi\nu_0^2 \tau_{sp} c^{-3}}{g(\nu_0) \tau_c} \quad (3.12)$$

i ima najmanju vrednost pri najvećoj vrednosti $g(\nu_0)$, a to je baš u centru linije ν_0 .

Forma krive $g(\nu_0)$ odredena je sa dva tipa mehanizma širenja linije i to :

- 1) homogenim (Lorencova forma)
- 2) nehomogenim (Gausova forma)

Homogeno širenje nastaje u sudarima atoma sa drugim atomima, jonima, slobodnim elektronima, ili zidovima laserske cevi.

Frekventna raspodela sa centrom u ν_0 i širinom $\Delta\nu$ ima Lorensovnu formu :

$$g(\nu_0) = \lim_{\nu \rightarrow \nu_0} \frac{1}{2\pi} \frac{\Delta\nu}{[(\nu - \nu_0)^2 + (\Delta\nu/2)^2]} = \frac{2}{\pi \Delta\nu} \quad (3.13)$$

Nehomogeno širenje nastaje usled termičkog kretanja atoma ili molekula koji zrače i javlja se Doplerov efekat. Frekventna raspodela ima Gausovu formu.

Kod CO_2 TEA lasera nehomogeno širenje možemo zanemariti, jer relativno visok pritisak gasa u laserskoj cevi uslovljava veoma veliki broj sudara u jedinici vremena.

Ne uzimajući u obzir spontane prelaze, možemo napisati jednačinu koja opisuje promenu intenzitet zračenja u laserskoj ce-

vi uzimajući u obzir vrednost $g(\nu_0)$ iz (3.13) :

$$\begin{aligned} \frac{dI_{\nu_0}}{dt} &= -\frac{dI_{\nu_0}}{\tau_c} + \frac{c^3 \Delta N I_{\nu_0}}{4\pi^2 \nu_0^2 \Delta\nu \tau_{sp}} = \\ &= -\frac{dI_{\nu_0}}{\tau_c} + c\nu_0 \Delta N \left[\frac{\lambda_0^2}{4\pi^2 \nu_0 \Delta\nu \tau_{sp}} \right] I_{\nu_0} \quad (3.14) \end{aligned}$$

Manes i Seguin uvode faktor popune F koji množe sa drugim članom jednačine (3.14), a koji predstavlja odnos zapremine ispunjene aktivnom sredinom, i ukupne zapremine rezonatora.

Drugačije rečeno veličina F predstavlja odnos dužine pojačavачke sredine, i optičke dužine rezonatora.

Jednačini (3.14) mora se dodati i član koji opisuje spontanu emisiju, jer se i ona odigrava samo mnogo sporije. Spontana emisija prethodi stimulisanoj jer ona upravo i inicira lasersku emisiju. Taj član ima sledeći oblik :

$$N_{001} \cdot P(J) \cdot S$$

Veličina $N_{001} P(J)$ predstavlja broj molekula na višem nivou, a koeficijent S ima iznosi :

$$S = \frac{2 \lambda_0^2 d\nu}{\pi A \tau_{sp} \Delta\nu} \quad (3.15)$$

Uvodeći aproksimaciju da je odnos širine linije laserskog i spontanog zračenja $d\nu / \Delta\nu = 2 \cdot 10^{-3}$, i odnos kvadrata talsne dužine i površine ogledala $\lambda_0^2 / A \approx 3 \cdot 10^{-7}$ dobija se :

$$S = \frac{1.2 \cdot 10^{-9}}{\pi \tau_{sp}} \quad (3.16)$$

Konačno se može napisati jednačina koja opisuje promenu inte-

nziteta zračenja tokom vremena :

$$\frac{dI_{\nu_0}}{dt} = - \frac{dI_{\nu_0}}{\tau_c} + ch\nu_0 \left[\frac{\Delta N WI_{\nu_0}}{h} + N_{001} P(J) S \right] \quad (3.17)$$

$$W = \frac{F \lambda_0^2}{4\pi^2 \nu_0 \Delta\nu \tau_{sp}} \quad (3.18)$$

Osnovni razlog širenja linija predstavljaju sudari između čestica koje emituju zračenje. Lengyel B.A. daje korelaciju sa sirine linije sa srednjim vremenom između dva sudara kao:

$$\Delta\nu_L = \frac{1}{\pi\tau} \quad (3.19)$$

gde je τ - srednje vreme između dva sudara

U slučaju gasne smeše molekula a i b vrste Siegman A.E. daje sledeću formulu za broj sudara u jedinici zapremine i jedinici vremena:

$$Z_{ab} = N_a N_b Q_{ab} \left[\frac{8kT}{\pi} \left(\frac{1}{M_a} + \frac{1}{M_b} \right) \right]^{1/2} \quad (3.20)$$

gde je Q_{ab} (cm^2) - presek za sudar molekula a i b

U slučaju molekula vrste a srednje vreme τ_a (b) između sudara a-b iznosi:

$$\frac{1}{\tau_a(b)} = \frac{Z_{ab}}{N_a} = N_b Q_{ab} \left[\frac{8kT}{\pi} \left(\frac{1}{M_a} + \frac{1}{M_b} \right) \right]^{1/2} \quad (3.21)$$

U našem slučaju je:

$$\frac{1}{\tau_{CO_2}} = \frac{1}{\tau_{CO_2(CO_2)}} + \frac{1}{\tau_{CO_2(N_2)}} + \frac{1}{\tau_{CO_2(He)}} \quad (3.22)$$

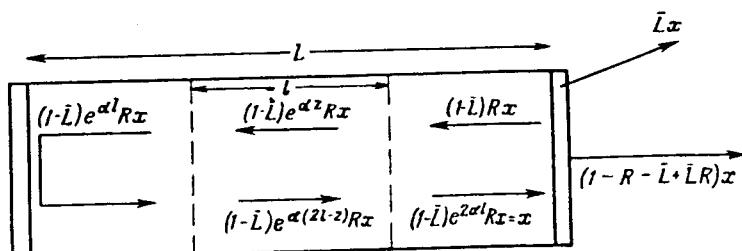
$$\Delta\nu_L = \sum_t \left\{ \frac{N_t Q_t}{\pi} \left[\frac{8kT}{\pi} \left(\frac{1}{M_a} + \frac{1}{M_b} \right) \right]^{1/2} \right\} \quad (3.23)$$

Poglavlje III : Lasersko zračenje

Veličina koja karakteriše aktivnu sredinu lasera je koeficijent pojačanja aktivne sredine α i definiše se kao pojačanje po jedinici duzine. Za pojačanje slabog signala važi :

$$I_v = I_0 e^{\alpha \cdot x} \quad (3.24)$$

Ostala je nepoznata veličina τ_c tj. vreme života fotona u laserskom rezonatoru. Zbog toga ćemo analizirati kontinualni laser čiji rezonator ima dužinu L , a dužina pojačavačke sredine iznosi l . Koeficijent pojačanja sredine je konstantan duž puta zraka i iznosi α .



Slika 3. Šematski prikaz izmene intenziteta zračenja duž ose rezonatora

Energija koji se kreće u smjeru izlaznog ogledala iznosi x . Deo energije $R \cdot x$ se odbija nazad u rezonator, a deo $\bar{L} \cdot x$ se se gubi (difrakcioni gubici i dr.). U rezonatoru na rastojanju z od izlaznog ogledala intenzitet zraka se povećao za $e^{\alpha \cdot z}$ puta. Prilikom punog prolaza zraka kroz rezonator intenzitet se poveća za $e^{2 \cdot \alpha \cdot L}$ puta. Ukoliko se posmatra stacionarni slučaj, posle punog prolaza zraka intenzitet popriima prvobitnu vrednost. Znači :

$$(1 - \bar{L}) e^{2 \cdot \alpha \cdot L} R \cdot x = x$$

$$(1 - \bar{L}) e^{2 \cdot \alpha \cdot L} R \cdot = 1 \quad (3.25)$$

Poglavlje III : Lasersko zračenje

Pojačanje aktivne sredine iz jednačine (3.20) iznosi :

$$\alpha = - \left(\frac{1}{2} LF \right) \ln [R(1 - L)] \quad F = 1 / L \quad (3.26)$$

Izlažni intenzitet iznosi :

$$I_{izl} = (1 - R - L + \bar{L} \cdot R) \cdot x \quad (\text{erg} \cdot \text{cm}^{-2} \cdot \text{s}^{-1}) \quad (3.27)$$

Izlažna snaga se izračunava kao :

$$P_{izl} = A(1 - R - L + \bar{L} \cdot R) \cdot x \quad (10^{-7} \text{ W}) \quad (3.28)$$

gde je A - površina poprečnog preseka izlažnog ogledala (cm^2)

Veličinu x nije moguće izračunati korišćenjem kinetičkog modela, nego je moguće izračunati intenzitet usrednjeni po jedinici dužine na sledeći način :

$$I_v = \frac{1}{l} \int_0^l I_z \cdot dz = \frac{1}{l} \int_0^l (e^{\alpha z} Rx + e^{\alpha(2l-x)} Rx)(1 - \bar{L}) dz$$

Integraljenjem uzimanjem u obzir (3.20) dobija se :

$$I_v = - \frac{2x(1 - R(1 - \bar{L}))}{\ln(R(1 - \bar{L}))} \quad (3.29)$$

Zamenom (3.29) u (3.28) dobija se :

$$P_{izl} = - \frac{A}{2} \ln[R(1 - \bar{L})] \cdot I_v \frac{(1 - R - \bar{L} + \bar{L} \cdot R)(10^{-7} \text{ W})}{1 - R(1 - \bar{L})} \quad (3.30)$$

Na kraju vreme života fotona u laserskom rezonatoru iznosi :

$$\tau_c = - \frac{2 \cdot LF}{c \ln(R(1 - \bar{L}))} \quad (3.31)$$

POGLAVLJE IV

VIBRACIONA KINETIKA

Zbog analize kinetike ugljen-dioksidnih lasera, uvešćemo sledeće oznake :

E_1 - energija simetričnog valentnog moda CO_2 (stanje 10^00)

E_2 - energija deformacionog moda CO_2 (stanje 02^00)

E_3 - energija asimetričnog moda CO_2 (stanje 00^01)

E_4 - vibraciona energija N_2 (stanje $v = 1$)

E_5 - vibraciona energija CO (stanje $v = 1$)

X_1 - brzina elektronsko-molekulske pobude nivoa 10^00

X_2 - brzina elektronsko-molekulske pobude nivoa 02^00

X_3 - brzina elektronsko-molekulske pobude nivoa 00^01

X_4 - brzina elektronsko-molekulske pobude nivoa $v=1$ kod N_2

X_5 - brzina elektronsko-molekulske pobude nivoa $v=1$ kod CO

T_1, T_2, T_3, T_4, T_5 - efektivne vibracione temperature koje odgo-
varaju energijama E_1, E_2, E_3, E_4, E_5 respektivno

$\nu_1, \nu_2, \nu_3, \nu_4, \nu_5$ - vibracione frekvencije

ν_0 - frekvencija laserskog zračenja linije $00^01 \rightarrow 10^00$

τ_{ij} - vremena relaksacija energetskih nivoa, pri čemu prvi
indeks (i) označava početni nivo, a drugi indeks (j)
označava finalni nivo. Vrednosti indeksa su uskladjeni
sa indeksima za energije, a ako je vrednost indeksa 0,
relaksacija se vrši na račun povećanja translacione
energije.

ΔN - rezlika broja molekula CO_2 na nivoima 00^01 i 10^00 .

I_ν - intenzitet laserskog zračenja.

$\hbar\nu_1, \dots, \hbar\nu_5$ - energije vibracija odgovarajućih nivoa

N_i - brojevi molekula ili atoma i-te vrste u aktivnoj sredi-
ni lasera

Poglavlje IV : Vibraciona kinetika

U najgrubljim crtama rad lasera se odvija na sledeći način :

- aktivnu sredinu lasera čini smeša tri gasa :

- a) ugljen-dioksida CO_2
- b) azota N_2
- c) helijuma He

U toku rada deo molekula ugljen-dioksida disosuje na kiseonik i ugljen-monoksid.

- Elektroni male energije (do 10eV) pobuduju njihove vibracione nivoje (izuzev helijuma, koji je jednoatoman i ne poseduje vibracione nivoje).

- Među molekulima se vrši razmena energije pomoću procesa koji će biti razmatrani niže, i ostvaruje se inverzna naseljenošć molekula CO_2 .

- Deo vibracione energije se pretvara u lasersku emisiju, a veći deo se pretvara u translatornu energiju molekula povećavajući na taj način temperaturu gasne smeše.

Razmotrićemo najpre dva najvažnija procesa, pomoću kojih se razmenjuje energija između molekula, a to su :

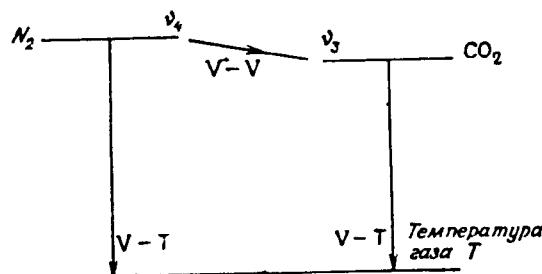
- 1) V - V tj. vibraciono-vibracioni proces (relaksacija)
- 2) V - T tj. vibraciono-translacioni proces (relaksacija)

Kod V - V procesa se energija razmenjuje između vibracionih modova molekula CO_2 , N_2 i CO. To su :

V - V razmena energije između asimetričnog moda CO_2 (00^01) i molekula N_2 ($v = 1$) ; τ_{43}

Ovaj proces je već spomenut prilikom razmatranja pobude lasera, kao sudar druge vrste. Zbog male razlike energija između nivoa ($\frac{1}{\lambda} = 2349,3 \text{ cm}^{-1}$ za CO_2 ; $\frac{1}{\lambda} = 2330,7 \text{ cm}^{-1}$ za N_2), dočarava se razmene energije.

Pošto je $h(\nu_4 - \nu_3)/k = 25 \text{ K}$, može se uzeti $\nu_4 \approx \nu_3$.



Slika 4. Proces predaje energije u sistemu $N_2 - CO_2$

Energija nivoa E_4 je saglasno izrazu (1.15) jednaka :

$$E_4(T) = N\hbar\nu_4 [\exp(h\nu_4/kT) - 1]^{-1} \quad (4.1)$$

Energija nivoa E_3 je jednaka :

$$\begin{aligned} E_3 &= E_3(T_3) = N\hbar\nu_3 [\exp(h\nu_3/kT_3) - 1]^{-1} \approx N\hbar\nu_4 [\exp(h\nu_4/kT_3) - 1]^{-1} \\ &= E_4(T_3) \end{aligned} \quad (4.2)$$

Brzina smanjivanja energije nivoa E_4 je data kao :

$$\frac{dE_4}{dt} = \frac{E_4(T_3) - E_4}{\tau_{43}} \quad (4.3)$$

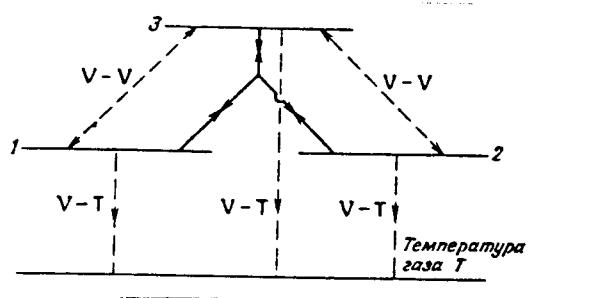
τ_{43} - vreme relaksacije $E_4 \rightarrow E_3$ i saglasno [1] iznosi :

$$\tau_{43} = N_{CO_2} k_{1,000,000,001}^{N_2 - CO_2}(T) \quad (4.4)$$

$$\tau_{43} = N_{CO_2} \cdot 1,71 \times 10^{-6} \exp(-175,3 / T^{1/3}) \quad (4.5)$$

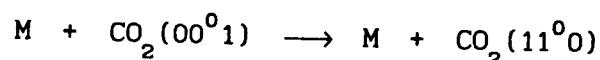
$V - V$ razmena energije izmedu tri vibraciona moda CO_2 vrši

se između asimetričnog valentnog moda (ν_3), simetričnog valentnog moda (ν_1), i deformacionog moda (ν_2)



Slika 5. Procesi razmene energije u molekulu CO_2

Ovo se dešava prilikom sudara bilo kojeg molekula sa molekulom ugljen-dioksida u stanju (00^01).



Prelazi označeni isprekidanim linijama se mogu zanemariti u odnosu na prelaze označene punim linijama pri kojima jedan kvant $h\nu_3$ prelazi istovremeno u dva kvanta $h\nu_1$ i $h\nu_2$. Prelazi su uslovljeni naseljenošću nivoa koja zavisi od $V - T$ relaksacija. Brzinu promene energije E_3 reguliše jednačina :

$$\frac{dE_3}{dt} = -\frac{E_3 - E_3(T)}{\tau_{VT}(T)} - \frac{E_3 - E_3(T, T_2)}{\tau_{VV}(T, T_2)} - \frac{E_3 - E_3(T, T_1)}{\tau_{VV}(T, T_1)} \quad (4.6)$$

gde su :

$$E_3(T, T_i) - ravnotežne vrednosti energija E_i \quad i = 1, 2$$

$$E_3(T, T_i) = N_{\text{CO}_2} h\nu_3 \left\{ \exp \left[\frac{h\nu_i}{kT} - \frac{h(\nu_i - \nu_3)}{kT} \right] - 1 \right\} \quad (4.7)$$

Poglavlje IV : Vibraciona kinetika

$\tau_{VT}(T)$ - vreme relaksacije između vibracionog i translacionog stepena slobode

$$\tau_{VT}^{-1}(T) = N_{CO_2} k_{001,000} \left[1 - \exp(-hv_3/kT) \right] \quad (4.8)$$

$\tau_{VV}(T, T_1)$ - vremena relaksacija između vibracionih modova $00^01 \rightarrow 10^00$ i $00^01 \rightarrow 01^10$

$$\begin{aligned} \tau_{VV}^{-1}(T, T_1) &= N_{CO_2} k_1 \exp(h(v_1 - v_3)/kT) \left[\exp(hv_1/kT_1) - 1 \right]^{-1} \times \\ &\times \left\{ \exp[hv_1/kT_1 + h(v_3 - v_1)/kT] - 1 \right\} \quad (4.9) \end{aligned}$$

$$k_1 = k_{001,010}$$

$$k_2 = k_{001,100}$$

Manes i Seguin transformišu izraz (4.7), i uvode nove veličine koje objedinjuju $E_3(T, T_2)$ i $E_3(T, T_1)$, kao i izraze za relaksaciona vremena.

Jedn. (4.10) :

$$E_3(T, T_1, T_2) = N_{CO_2} \frac{hv_3}{\exp\left[\frac{hv_1}{kT_1} + \frac{hv_2}{kT_2} + \frac{h(v_3 - v_2 - v_1)}{kT}\right]} \quad (4.10)$$

$$\begin{aligned} \tau_3^{-1}(T, T_1, T_2) &= \sum_t N_t k_{001,110}^t \exp\left[\frac{h(v_1 + v_2 - v_3)}{kT}\right] \times \\ &\times \left[\exp\left(\frac{hv_2}{kT_2}\right) - 1 \right]^{-1} \left[\exp\left(\frac{hv_1}{kT_1}\right) - 1 \right]^{-1} \times \\ &\times \left\{ \exp\left[\frac{hv_1}{kT_1} + \frac{hv_2}{kT_2} + \frac{h(v_3 - v_2 - v_1)}{kT}\right] - 1 \right\} \quad (4.11) \end{aligned}$$

indeks t znači da se sumira po svim komponentama radne smeše.

Vrednosti koeficijenata su saglasno [1] (u $\text{cm}^3 \text{s}^{-1}$) :

$$\text{za CO}_2 \quad k_{001,110} = 9,6 \cdot 10^{23} \cdot T^{-5,89} \cdot F(T) \quad (4.12)$$

$$\text{za N}_2 \quad k_{001,110} = 6,87 \cdot 10^{23} \cdot T^{-5,89} \cdot F(T) \quad (4.13)$$

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$$\text{za He} \quad k_{001;110} = 2,43 \cdot 10^{23} \cdot T^{-5,89} \cdot F(T) \quad (4.14)$$

$$\text{za CO} \quad k_{001;110} = 6,87 \cdot 10^{23} \cdot T^{-5,89} \cdot F(T) \quad (4.15)$$

$$F(T) = \exp(-4223/T - 672,7/T^{1/3} + 2683/T^{2/3}) \quad (4.16)$$

Konačno član koji pokazuje izmenu energije E_3 zbog razmene energije između tri moda izgleda :

$$\frac{dE_3}{dt} = \frac{E_3(T, T_1, T_2) - E_3}{\tau_3(T, T_1, T_2)} \quad (4.17)$$

$V - V$ razmena energije između simetričnog valentnog moda i deformacionog moda.

Razlika $\Delta \frac{1}{\lambda} = 102,8 \text{ cm}^{-1}$ između nivoa $10^0 0$ i $02^0 0$ omogućava rezonantnu razmenu energije između ta dva nivoa.

Takođe je i $2\nu_2 \approx \nu_1$ ($\nu_1 = 4,164 \cdot 10^{13} \text{ s}^{-1}$; $\nu_2 = 2 \cdot 10^{13} \text{ s}^{-1}$)

Brzina promene energije E_1 je jednaka :

$$\frac{dE_1}{dt} = \frac{E_1(T_2) - E_1}{\tau_{12}} \quad (4.18)$$

Saglasno jednačini (1.15) energija E je jednaka :

$$E_1(T_2) = \frac{2 \cdot N h \nu_1}{\exp(h \nu / k T) - 1} \quad (4.19)$$

Vreme $V - V$ relaksacije daje se formulom :

$$\tau_{12}(T_2)^{-1} \equiv 2 \cdot \sum_t N_t k_{020,100}^t \frac{1 + \exp(-h \nu_2 / k T_2)}{1 - \exp(-h \nu_2 / k T_2)} \quad (4.20)$$

koeficijenti $k_{020,100}^t$ imaju sledeće vrednosti saglasno [1]:

$$\text{za CO}_2 \quad k_{020,100} = 8,65 \cdot 10^{-15} \cdot T^{3/2} \quad (4.21)$$

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$$\text{za } N_2 \quad k_{020,100} = 3,68 \cdot 10^{-16} \cdot T^{3/2} \quad (4.22)$$

$$\text{za He} \quad k_{020,100} = 4,23 \cdot 10^{-17} \cdot T^{3/2} \quad (4.23)$$

$$\text{za CO} \quad k_{020,100} = 3,68 \cdot 10^{-16} \cdot T^{3/2} \quad (4.24)$$

Deo molekula CO_2 disosuje na kiseonik i ugljen-monoksid.

Elektroni male energije takođe pobuduju vibracioni nivo $v=1$ kod CO. Frekvencija oscilovanja je $\nu_5 = 6,45 \cdot 10^{13} s^{-1}$, i bliska je i sa ν_4 , i sa ν_3 .

Zbog toga dolazi do $V - V$ razmene energije sa molekulima azota i ugljen-dioksida, tj. sa nivoima (00^01) kod CO_2 , i $v = 1$ kod N_2 .

J. Tulip je dobio članove koj opisuju brzinu promene energije E_5 (energija vibracionog nivoa $v=1$).

$$\frac{dE_5}{dT} = - \frac{E_5 - E_5(T, T_3)}{\tau_{53}(T, T_3)} - \frac{E_5 - E_5(T, T_4)}{\tau_{54}(T, T_4)} \quad (4.25)$$

Saglasno jednačini (1.15) energija E_5 je jednaka :

$$E_5 = \frac{h\nu_5(1-f)Nco_2}{\exp(h\nu_5/kT_5) - 1} \quad (4.26)$$

Faktor f predstavlja deo molekula ugljen-dioksida koji nije disosovao.

Ostale veličine se izračunavaju na sledeći način :

$$E_5(T, T_3) = (1-f)Nco_2 h\nu_5 \left[\exp[h\nu_3/kT_3 - h(\nu_3 - \nu_5)/kT] - 1 \right]^{-1} \quad (4.27)$$

$$E_5(T, T_4) = (1-f)Nco_2 h\nu_5 \left[\exp[h\nu_4/kT_4 - h(\nu_4 - \nu_5)/kT] - 1 \right]^{-1} \quad (4.28)$$

$$\tau_{53}(T, T_3)^{-1} = f Nco_2 k_{1,000;0,001}^{CO-CO_2}(T) \exp[h(\nu_3 - \nu_5)/kT] \times$$

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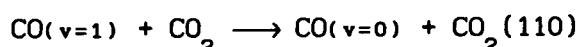
$$\times \left[\exp(h\nu_3/kT_3) - 1 \right]^{-1} \times \left[\exp[h\nu_3/kT_3 + h(\nu_5 - \nu_3)/kT] - 1 \right]^{-1} \quad (4.29)$$

$$\tau_{54}(T, T_4)^{-1} = N_{CO_2} k_{10,01}^{CO-N_2} (T) \exp[h(\nu_4 - \nu_5)/kT] \left[\exp(h\nu_4/kT_4) - 1 \right]^{-1} \times \\ \times \left[\exp[h\nu_4/kT_4 + h(\nu_5 - \nu_4)/kT] - 1 \right]^{-1} \quad (4.30)$$

$$k_{1,000;0,001}^{CO-CO_2}(T) = 1,56 \cdot 10^{-11} \cdot \exp(-30,1 / T^{1/3}) \quad (4.31)$$

$$k_{10,01}^{CO-N_2}(T) = 1,78 \cdot 10^{-6} \cdot \exp(-210 / T^{1/3}) \quad (4.32)$$

Takođe, deo molekula CO na nivou $\nu=1$ razmenjuje energiju sa tri vibraciona moda molekula CO_2 sa karakterističnim vremenom τ_5 :



član koji opisuje ovaj proces izgleda :

$$-\frac{E_5 - E_5(T, T_1, T_2)}{\tau_5(T, T_1, T_2)} \quad (4.33)$$

(4.34) :

$$E_5(T, T_1, T_2) = (1-f)N_{CO_2} h\nu_5 / \exp\left[\frac{h\nu_1}{kT_1} + \frac{h\nu_2}{kT_2} + \frac{h(\nu_5 - \nu_2 - \nu_1)}{kT}\right]^{-1}$$

$$\tau_5(T, T_1, T_2)^{-1} = (1-f)N_{CO_2} k_{1,000;0,110}^{CO-CO_2} \left[\exp\left(\frac{h\nu_2}{kT_2}\right) - 1 \right]^{-1} \times \\ \left[\exp\left(\frac{h\nu_1}{kT_1}\right) - 1 \right]^{-1} \left\{ \exp\left[\frac{h\nu_1}{kT_1} + \frac{h\nu_2}{kT_2} + \frac{h(\nu_5 - \nu_2 - \nu_1)}{kT}\right] - 1 \right\} \quad (4.35)$$

$$k_{1,000;0,110}^{CO-CO_2} = 5,96 \cdot 10^{-22} \cdot T^{-5,86} \cdot F(T)$$

$V-T$ procesi doprinose smanjenju vibracione energije gasne smeše, a povećanju translacione energije molekula, a time i

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povišenju temperature aktivne sredine. U ovom ključnu ulogu igra helijum. Njegova uloga je dvojaka :

1) u V - T procesima smanjuje naseljenost nivoa 10^0 ₀ i 02^0 ₀, a time indirektnog povećanja inverzne naseljenosti nivoa 00^0 ₁, i povećanja laserske emisije.

2) velika topotna provodljivost helijuma omogućuje efikasno hlađenje aktivne sredine, a time i poboljšavanja karakteristika lasera, jer laser radi efikasno u opsegu temperaturu od 300K - 500K. Dalje povećanje temperature pogoršava karakteristike zbog homogenog i nehomogenog širenja linija, povećanja naseljenosti nižih vibracionih nivoa, a to smanjuje inverznu naseljenost.

Osim helijuma, u V - T procesima učestvuju i ostali molekuli, ali je proces najefikasniji sa helijumom. U nekim laserskim modelima helijum je zamenjen malom koncentracijom vodene pare.

Razmena energije sa simetričnim modom je opisana formulom :



$$\frac{dE_1}{dt} = \frac{E_1 - E_1(T)}{\tau_{10}(T)} \quad (4.36)$$

Razmena energije sa asimetričnim modom je opisana formulom :

$$\frac{dE_2}{dt} = \frac{E_2 - E_2(T)}{\tau_{20}(T)} \quad (4.37)$$

Veličine $E_1(T)$ i $E_2(T)$ su date izrazom (1.15) :

$$E_1(T) = N_{\text{CO}_2} h\nu_1 [\exp(h\nu_1/kT) - 1]^{-1} \quad (4.38)$$

$$E_2(T) = N_{\text{CO}_2} h\nu_2 [\exp(h\nu_2/kT) - 1]^{-1} \quad (4.39)$$

Vremena relaksacija se izračunavaju na sledeći način :

$$\tau_{10}^{-1}(T) = \sum_t N_t k_{100;000}^t [1 - \exp(-hv_1 / kT)] \quad (4.40)$$

$$\tau_{20}^{-1}(T) = \sum_t N_t k_{010;000}^t [1 - \exp(-hv_2 / kT)] \quad (4.41)$$

Između ove dve veličine postoji veza $\tau_{10} = 4,5 \cdot \tau_{20}$

Koeficijenti $k_{010;000}^t$ iznose saglasno [1] :

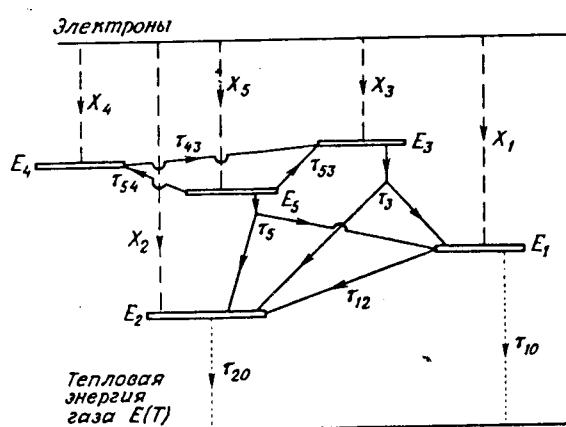
$$\text{za } CO_2 \quad k_{010;000}^t = 4,6 \cdot 10^{-10} \cdot \exp(-77 / T^{1/3}) \quad (4.42)$$

$$\text{za } N_2 \quad k_{010;000}^t = 9,6 \cdot 10^{-11} \cdot \exp(-77 / T^{1/3}) \quad (4.43)$$

$$\text{za } He \quad k_{010;000}^t = 8,1 \cdot 10^{-11} \cdot \exp(-45 / T^{1/3}) \quad (4.44)$$

$$\text{za } CO \quad k_{010;000}^t = 6,82 \cdot 10^{-8} \cdot \exp(-77 / T^{1/3}) \quad (4.45)$$

Sada se može napisati pet jednačina koje opisuju promene energija nivoa E_1, \dots, E_5 :



Slika 6. Dijagram energetskih nivoa sistema $N_2 - CO_2 - CO$

- Punim linijama sa strelicama su označeni $V - T$ prelazi

- Tačkastim linijama su označeni $V - V$ prelazi

Isprekidanim linijama su prikazani procesi elektronske pobude

- nivo E_1 (mod 10^0) :

Smanjivanje energije usled $V - T$ relaksacije sa karakterističnim vremenom τ_{10} (4.36), i $V - V$ razmene energije sa deformacionim modom sa vremenom relaksacije τ_{12} (4.18).

Povećanje energije usled $V - V$ razmene energije sa tri vibraciona moda sa karakterističnim vremenom τ_3 (4.17), $V - V$ razmene energije sa nivoom $v = 1$ molekula CO sa karakterističnim vremenom τ_5 (4.33), elektronskom pobudom, i apsorpcijom fotona iz laserskog snopa . Jednačina (4.46) :

$$\begin{aligned} \frac{dE_1}{dt} = & N_e(t)fN_{CO_2} h\nu_1 X_1 - \frac{E_1 - E_1(T)}{\tau_{10}(T)} - \frac{E_1 - E_1(T_2)}{\tau_{12}(T_2)} + \\ & + \left[\frac{h\nu_1}{h\nu_3} \right] \frac{E_3 - E_3(T, T_1, T_2)}{\tau_3(T, T_1, T_2)} + \left[\frac{h\nu_1}{h\nu_5} \right] \frac{E_5 - E_5(T, T_1, T_2)}{\tau_5(T, T_1, T_2)} + h\nu_1 \Delta N W I_\nu \end{aligned}$$

- nivo E_2 (mod 02^0) :

Smanjivanje energije usled $V - T$ relaksacije sa karakterističnim vremenom τ_{10} (4.36), pri kojoj molekul CO_2 prelazi u osnovno stanje (000).

Povećanje energije usled $V - V$ razmene energije sa simetričnim modom sa karakterističnim vremenom τ_{12} (4.18), $V - V$ razmene energije između tri moda CO_2 sa karakterističnim vremenom τ_3 (4.17), razmenom energije sa nivoom $v = 1$ molekula CO sa karakterističnim vremenom τ_5 (4.33), i elektronskom pobudom. Jednačina (4.47) :

$$\begin{aligned} \frac{dE_2}{dt} = & N_e(t)fN_{CO_2} h\nu_2 X_2 + \frac{E_1 - E_1(T_2)}{\tau_{12}(T_2)} - \frac{E_1 - E_1(T_2)}{\tau_{20}(T_2)} + \\ & + \left[\frac{h\nu_2}{h\nu_3} \right] \frac{E_3 - E_3(T, T_1, T_2)}{\tau_3(T, T_1, T_2)} + \left[\frac{h\nu_2}{h\nu_5} \right] \frac{E_5 - E_5(T, T_1, T_2)}{\tau_5(T, T_1, T_2)} \end{aligned}$$

- nivo E_3 (mod 00^01) :

Smanjivanje energije usled V - V relaksacije sa karakterističnim vremenom τ_3 (4.17), i laserskog prelaza $00^01 \rightarrow 10^00$. Povećanje energije usled V - V razmene energije sa nivoom $v=1$ molekula N_2 sa karakterističnim vremenom τ_{43} (4.3), V-V razmene energije sa molekulom CO sa karakterističnim vremenom τ_{53} (4.25), i elektronskim pobudivanjem .

Jednačina (4.48) :

$$\frac{dE_3}{dt} = N_e(t) f N_{CO_2} h\nu_3 X_3 + \frac{E_4 - E_4(T_3)}{\tau_{43}(T)} + \left[\frac{h\nu_3}{\hbar\nu_5} \right] \frac{E_5 - E_5(T, T_3)}{\tau_{53}(T, T_3)} - \frac{E_3 - E_3(T, T_1, T_2)}{\tau_3(T, T_1, T_2)} - h\nu_3 \cdot \Delta N \cdot W \cdot I_\nu$$

- nivo E_4 (molekul N_2 mod $v=1$) :

Smanjivanje energije usled V - V relaksacije sa karakterističnim vremenom τ_{43} (4.3) sa modom (00^01) molekula CO. Povećanje energije usled V - V razmene energije sa nivoom $v=1$ molekula CO sa karakterističnim vremenom τ_{54} (4.25), i elektronskim pobudivanjem .

Jednačina (4.49) :

$$\frac{dE_4}{dt} = N_e(t) N_{N_2} h\nu_4 X_4 - \frac{E_4 - E_4(T_3)}{\tau_{43}(T)} + \left[\frac{h\nu_4}{\hbar\nu_5} \right] \frac{E_5 - E_5(T, T_4)}{\tau_{54}(T, T_4)}$$

- nivo E_5 (molekul CO mod $v=1$) :

Smanjivanje energije usled V - V relaksacije sa karakterističnim vremenom τ_{53} (4.25) sa modom (00^01) molekula CO_2 , razmene energije usled V - V relaksacije sa nivoom $v=1$ molekula N_2 sa karakterističnim vremenom τ_{54} (4.25), i razmene energije sa vibracionim modovima (10^00) i (02^00) molekula CO_2 . Povećanje energije potiče od elektronskog pobudivanja .

Poglavlje IV : Vibraciona kinetika

Jednačina (4.50) :

$$\frac{dE_5}{dt} = N_e(t)(1-f)N_{CO_2} h\nu_5 X_5 - \frac{E_5 - E_5(T_3, T_3)}{\tau_{53}(T, T_3)} - \frac{E_5 - E_5(T, T_4)}{\tau_{54}(T, T_4)} - \\ - \frac{E_5 - E_5(T, T_1, T_2)}{\tau_5(T, T_1, T_2)}$$

Sve veličine su ranije odredene osim razlike broja molekula na nivoima 00^01 i 10^00 koja iznosi :

$$\Delta N = N_{001} P(J) - \left[\frac{\vartheta_J}{\vartheta_{J+1}} \right] N_{100} P(J+1) \quad (4.51)$$

$$N_{001} = f N_{CO_2} \exp\left(\frac{-h\nu_3}{kT_3}\right) \times \left[1 - \exp\left(\frac{-h\nu_1}{kT_1}\right)\right] \times \left[1 - \exp\left(\frac{-h\nu_2}{kT_2}\right)\right]^2 \times \\ \times \left[1 - \exp\left(\frac{-h\nu_3}{kT_3}\right)\right] \quad (4.52)$$

$$N_{100} = f N_{CO_2} \exp\left(\frac{-h\nu_1}{kT_1}\right) \times \left[1 - \exp\left(\frac{-h\nu_1}{kT_1}\right)\right] \times \left[1 - \exp\left(\frac{-h\nu_2}{kT_2}\right)\right]^2 \times \\ \times \left[1 - \exp\left(\frac{-h\nu_3}{kT_3}\right)\right] \quad (4.53)$$

$$\vartheta_J = 2 \cdot J + 1$$

Velicina $P(J)$ se naziva rotacioni faktor, i izračunava se na sledeći način :

$$P(J) = (2hcB / kT) \cdot \vartheta_J \cdot \exp\left[\frac{-hcBJ(J+1)}{kT}\right] \quad (4.54)$$

gde je saglasno [1] $B = 0.4 \text{ cm}^{-1}$

Poglavlje IV : Vibraciona kinetika

Kinetičke energije atoma i molekula se izračunavaju kao :

$$\frac{1}{2} Mv^2 = \frac{3}{2} kT \quad \text{i} \quad \frac{1}{2} Mv^2 = \frac{5}{2} kT$$

Ukupna kinetička energija aktivne sredine lasera iznosi :

$$E = \left(\frac{5}{2} N_{N_2} + \frac{5}{2} N_{CO_2} + \frac{3}{2} N_{He} \right) kT \quad (4.55)$$

Ona se tokom rada lasera povećava zbog V - T relaksacionih procesa, u kojima najviše učestvuje helijum smanjivajući naseljenost nivoa (10^0) i (02^0). Jednačina koja opisuje promenu temperature (t.j. kinetičke energije radne smeše) može se dobiti uzimajući u obzir članove koji opisuju V - T procese u jednačinama koje opisuju promene energija nivoa E_1, \dots, E_5 , kao i članove koji opisuju dezaktivaciju pobudenih nivoa molekula azota i ugljen-monoksida.

Jednačina koja opisuje promenu kinetičke energije (temperatu- re) gasne smeše glasi (jedn. 4.56):

$$\begin{aligned} \frac{dE}{dt} &= \frac{E_1 - E_1(T)}{\tau_{10}(T)} - \frac{E_2 - E_2(T)}{\tau_{20}(T)} + \\ &+ \left(1 - \frac{h\nu_2}{h\nu_3} - \frac{h\nu_1}{h\nu_3} \right) \frac{E_3 - E_3(T, T_1, T_2)}{\tau_3(T, T_1, T_2)} + \left(1 - \frac{h\nu_4}{h\nu_5} \right) \frac{E_5 - E_5(T, T_4)}{\tau_{54}(T, T_4)} + \\ &+ \left(1 - \frac{h\nu_2}{h\nu_5} - \frac{h\nu_1}{h\nu_5} \right) \frac{E_5 - E_5(T, T_1, T_2)}{\tau_5(T, T_1, T_2)} + \left(1 - \frac{h\nu_3}{h\nu_5} \right) \frac{E_5 - E_5(T, T_3)}{\tau_{53}(T, T_3)} \end{aligned}$$

Ovom jednačinom je zaokružen model ugljen-dioksidnog lasera. Na kraju treba napomenuti da su uzeti u obzir samo dominantni procesi.

Nije uzeto u razmatranje sledeće :

- 1) V - T prelaz energije E_4 u toplotnu sa karakterističnim vremenom τ_{40} .
- 2) V - T prelaz energije E_3 u toplotnu sa karakterističnim vremenom τ_{30} .
- 3) V - T prelaz energije E_5 u toplotnu sa karakterističnim vremenom τ_{50} .
- 4) V - V prelaz iz stanja E_4 u stanje E_2 za vreme τ_{42} .
- 5) V - V prelaz iz stanja E_4 u stanje E_1 za vreme τ_{41} .
- 6) V - V prelaz iz stanja E_3 u stanje E_1 za vreme τ_{31} .
- 7) V - V prelaz iz stanja E_3 u stanje E_2 za vreme τ_{32} .
- 8) V - V prelaz iz stanja E_5 u stanje E_2 za vreme τ_{52} .
- 9) V - V prelaz iz stanja E_5 u stanje E_1 za vreme τ_{51} .
- 10) V - V prelaz iz stanja E_1 u stanje E_2 za vreme τ_{12} .
- 11) V - V prelaz kvanta E_4 u dva kvanta E_1 i E_2 sa karakterističnim vremenom τ_4 koje je analogno vremenu τ_3 .

Sistem jednačina bi morao biti dopunjeno članovima koji opisuju te procese ukoliko bi ih uzeli u obzir. Neuzimanje u obzir gore navedene procese ne bi trebalo a izazove veće greške pri numeričkom rešavanju sistema (do nekoliko procenata), jer su preseci za takve procese mali tj. vremena relaksacija su velika. To znači da se gore navedeni procesi dešavaju mnogo sporje od dominantnih.

POGLAVLJE V

MATEMATIČKI MODEL

Na kraju kada su jednačine koje opisuju najvažnije procese i evoluciju laserskog zraka formirane, možemo pristupiti njihovom rešavanju. Još jednom ćemo napisati jednačine od (4.46) do (4.50) i jednačinu (3.17) :

$$\frac{dE_1}{dt} = N_e(t)fN_{CO_2} h\nu_1 X_1 - \frac{E_1 - E_1(T)}{\tau_{10}(T)} - \frac{E_1 - E_1(T_2)}{\tau_{12}(T_2)} + \\ + \left[\frac{h\nu_1}{h\nu_3} \right] \frac{E_3 - E_3(T, T_1, T_2)}{\tau_3(T, T_1, T_2)} + \left[\frac{h\nu_1}{h\nu_5} \right] \frac{E_5 - E_5(T, T_1, T_2)}{\tau_5(T, T_1, T_2)} + h\nu_1 \Delta N \cdot W \cdot I_\nu \quad (5.1)$$

$$\frac{dE_2}{dt} = N_e(t)fN_{CO_2} h\nu_2 X_2 + \frac{E_1 - E_1(T_2)}{\tau_{12}(T_2)} - \frac{E_1 - E_1(T_2)}{\tau_{20}(T_2)} + \\ + \left[\frac{h\nu_2}{h\nu_3} \right] \frac{E_3 - E_3(T, T_1, T_2)}{\tau_3(T, T_1, T_2)} + \left[\frac{h\nu_2}{h\nu_5} \right] \frac{E_5 - E_5(T, T_1, T_2)}{\tau_5(T, T_1, T_2)} \quad (5.2)$$

$$\frac{dE_3}{dt} = N_e(t)fN_{CO_2} h\nu_3 X_3 + \frac{E_4 - E_4(T_3)}{\tau_{43}(T)} + \left[\frac{h\nu_3}{h\nu_5} \right] \frac{E_5 - E_5(T, T_3)}{\tau_{53}(T, T_3)} \\ - \frac{E_3 - E_3(T, T_1, T_2)}{\tau_3(T, T_1, T_2)} - h\nu_3 \cdot \Delta N \cdot W \cdot I_\nu \quad (5.3)$$

(5.4):

$$\frac{dE_4}{dt} = N_e(t)N_{N_2} h\nu_4 X_4 - \frac{E_4 - E_4(T_3)}{\tau_{43}(T)} + \left[\frac{h\nu_4}{h\nu_5} \right] \frac{E_5 - E_5(T, T_4)}{\tau_{54}(T, T_4)} \\ \frac{dE_5}{dt} = N_e(t)(1-f)N_{CO_2} h\nu_5 X_5 - \frac{E_5 - E_5(T_3, T_3)}{\tau_{53}(T, T_3)} - \frac{E_5 - E_5(T, T_4)}{\tau_{54}(T, T_4)} - \\ - \frac{E_5 - E_5(T, T_1, T_2)}{\tau_5(T, T_1, T_2)} \quad (5.5)$$

$$\frac{dE}{dt} = \frac{E_1 - E_1(T)}{\tau_{10}(T)} - \frac{E_2 - E_2(T)}{\tau_{20}(T)} + \quad (5.6)$$

$$+ \left[1 - \frac{h\nu_2}{h\nu_3} - \frac{h\nu_1}{h\nu_3} \right] \frac{E_3 - E_3(T, T_1, T_2)}{\tau_3(T, T_1, T_2)} + \left[1 - \frac{h\nu_4}{h\nu_5} \right] \frac{E_5 - E_5(T, T_4)}{\tau_{54}(T, T_4)} +$$

$$+ \left[1 - \frac{h\nu_2}{h\nu_5} - \frac{h\nu_1}{h\nu_5} \right] \frac{E_3 - E_3(T, T_1, T_2)}{\tau_5(T, T_1, T_2)} + \left[1 - \frac{h\nu_3}{h\nu_5} \right] \frac{E_5 - E_5(T, T_3)}{\tau_{53}(T, T_3)}$$

$$\frac{dI_{\nu_0}}{dt} = - \frac{dI_{\nu_0}}{\tau_c} + ch\nu_0 \left[\frac{\Delta N WI_{\nu_0}}{h} + N_{001} P(J) S \right] \quad (5.7)$$

Vidimo da je ovo simultani sistem od sedam običnih diferencijskih jednačina I reda. Nepoznate su veličine E_1, E_2, E_3, E_4, E_5 i I_{ν_0} . Sistem se rešava numeričkim postupkom poznatim kao Hemingova metoda korektor-prediktor. Zadaju se sledeći parametri :

- 1) odnos komponenata u smeši
- 2) faktor popune F
- 3) dužina laserskog rezonatora L (cm)
- 4) površina poprečnog preseka laserske cevi A (cm^2)
- 5) koeficijent refleksije izlaznog ogledala R
- 6) pritisak gasa u laserskoj cevi p (atm)
- 7) brzine elektronskih pobuda X_1, X_2, X_3, X_4, X_5
- 8) konstante vezane za način elektronske pobude α, S, β
- 9) stepen disocijacije molekula CO_2

Takođe se zadaje početna vrednost temperature T, interval integracije i početni korak integracije.

Najpre se izračunavaju brojevi molekula svake vrste na osnovu poznate temperature, odnosa molekula u smeši i dimenzija laserske cevi.

Poglavlje V : Matematički model

Potom se izračunavaju startne vrednosti energija E_1, \dots, E_5 i E dok je $I_{\nu_0} = 0$.

Na prva tri vremenska koraka vrednosti nepoznatih se računaju Runge-Kuta metodom, jer da bi Hemingov postupak startovao moraju biti poznata prethodna tri rešenja. Algoritam i osnove ovih metoda bice date na kraju. Posle prednjeg intervala dobijamo vremensku evoluciju vrednosti energija E_1, \dots, E_5 i E (samim tim i vrednosti vibracionih temperatura T_1, \dots, T_5 i gasne temperature T) kao i intenziteta zračenja I_{ν_0} .

Jedna od provera valjanosti rezultata je provera zakona održanja energije.

Početnu energiju čine translaciona energija molekula i atoma E_{tr}^i , vibraciona energija $E_{(v)}^i$, elektronska energija koja se uključuje u pobudivanje lasera E_u .

Konačnu energiju čine takođe translaciona i vibraciona energija E_{tr}^f i $E_{(v)}^f$, izlazna energija zračenja E_{izl} i gubici E_{gub} .

Prema zakonu održanja energije je :

$$E_{tr}^i + E_{(v)}^i + E_u = E_{tr}^f + E_{(v)}^f + E_{izl} + E_{gub} \quad (5.8)$$

$$E_{tr}^{i,f} = \left(\frac{5}{2} N_{N_2} + \frac{5}{2} N_{CO_2} + \frac{3}{2} N_{He} \right) kT^{i,f} \quad (5.9)$$

$$E_{(v)}^{i,f} = \sum_{k=1}^5 E_k^{i,f} \quad (5.10)$$

$$E_u = [(h\nu_1 X_1 + h\nu_2 X_2 + h\nu_3 X_3) f N_{CO_2} + h\nu_4 X_4 N_{N_2} + h\nu_5 X_5 (1-f) N_{CO}] \times$$

$$\times \int_{t=0}^{t=t'} N_e(t) dt \quad (5.11)$$

$$E_{izl} = \frac{1}{21} \frac{(1 - R - \bar{L} + \bar{L} \cdot R)}{(1 - R + \bar{L} \cdot R)} \ln [R(1 - \bar{L})] \int_{t=0}^{t=t'} I_p(t) dt \quad (5.12)$$

$$E_{gub} = \frac{\bar{L}}{(1 - R - \bar{L} + \bar{L} \cdot R)} E_{izl} \quad (5.13)$$

Program za rešavanje je napisan u programskom jeziku FORTRAN i preveden u izvršnu verziju pomoću Microsoft 5.0 programskog paketa. Program se sastoji iz nekoliko celina :

1) GLAVNI PROGRAM - poziva ostale potprograme i obezbeđuje komunikaciju između njih. Takođe se u glavnom programu izračunavaju brojevi molekula svake vrste i vrednost statističke sume u početnom momentu. U glavnom programu su smeštene ulazno - izlazne naredbe pomoću kojih se vrši zadavanje parametara i promenljivih, i stampaju rešenja posle određenog broja koraka. (Slika 7.)

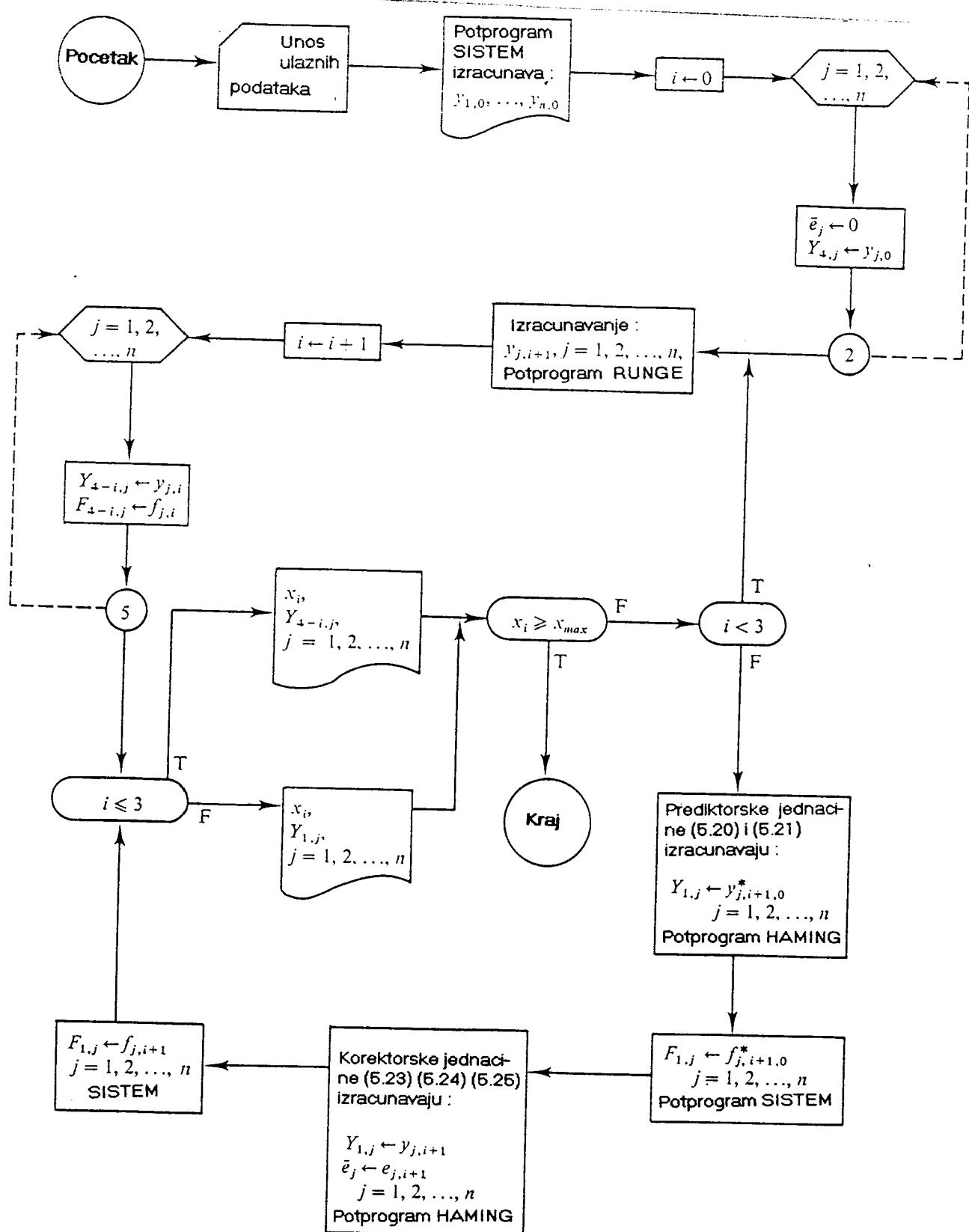
2) POTPROGRAM SISTEM - uzima od glavnog programa parametre i promenjive i na svakom vremenskom koraku izračunava vrednosti energija i intenziteta zračenja, i njihove izvode. Potprogram SISTEM poziva potprogram RATES koji izračunava vremena relaksacija, a takođe i potprogram ELEC koji izračunava vrednosti elektronske gustine u zavisnosti od načina pobude.

Potprogram SISTEM pozivaju potprogrami RUNGE i HAMING

2a) POTPROGRAM RATES - izračunava sva vremena relaksacija po formulama: (4.5), (4.11), (4.20), (4.29), (4.30), (4.35), (4.40) i (4.41). Ulazne promenljive su vrednosti temperatura.

2b) POTPROGRAM ELEC - izračunava vrednosti elektronskih gustina koristeći formulu (2.1) za slučaj lasera sa samostal-

Slika 7. Prikazan je tok glavnog programa.



nim pražnjenjem ili formulu (2.2) za slučaj elektrojonizacijskih lasera.

Ulagana veličine su vreme i parametri vezani za pobudu.

3) POTPROGRAM RUNGE - prethodi potprogramu HAMING i izračunava prva tri rešenja, a poziva ga glavni program. To je numerička metoda četvrtog reda sa promenljivim korakom integracije. Ako sistem diferencijalnih jednačina glasi :

onda na osnovu početnih vrednosti za y_1 možemo izračunati izvode. Ključni problem je kako izračunati vrednosti y_1 u sledećem vremenskom trenutku. Uzmimo da je korak integracije Δx . Runge-Kute metoda u okviru tog zadatog koraka četiri puta izračunava vrednost izvoda, i to :

1) na početku integracije t.j. u tački $x =$

$$f_1^{(1)} = f_1(x, y_1, y_2, \dots, y_n) \quad (5.15)$$

2) dva puta u sredini intervala t.j. u tački $x + \Delta x / 2$:

$$f_1^{(2)} = f_1 \left(x + \frac{\Delta x}{2}, y_1 + \frac{f_1^{(1)}}{2} \Delta x, \dots, y_N + \frac{f_N^{(1)}}{2} \Delta x \right) \quad (5.16)$$

$$f_1^{(3)} = f_1 \left(x + \frac{\Delta x}{2}, y_1 + \frac{f_1^{(2)}}{2} \Delta x, \dots, y_N + \frac{f_N^{(2)}}{2} \Delta x \right) \quad (5.17)$$

3) na kraju intervala u tački $x + \Delta x$.

$$f_1^{(4)} = f_1 \left(x + \Delta x, y_1 + f_1^{(3)} \Delta x, \dots, y_N + f_N^{(3)} \Delta x \right) \quad (5.18)$$

Na osnovu ovih vrednosti izvoda izračunavaju se vrednosti y_1 na kraju intervala (5.19) :

$$y_1(x + \Delta x) = y_1(x) + \frac{\Delta x}{2} (f_1^{(1)} + 2f_1^{(2)} + 2f_1^{(3)} + f_1^{(4)}) + \text{greska}$$

Provera pokazuje da se ovakva kombinacija izvoda $f_1^{(1)}$, $f_1^{(2)}$, $f_1^{(3)}$, $f_1^{(4)}$ slaže sa prva četiri člana razvoja funkcije $y_1(x + \Delta x)$ u Taylor-ov red. Greška metode je reda $(\Delta x)^5$.

Potprogram Runge poziva potprogram SISTEM, koji izračunava desne strane sistema jednačina tj. vrednosti izvoda.

4) POTPROGRAM HAMING - kad su poznata tri rešenja sistema na prethodnim koracima, može da startuje Hemingov metod korektor-prediktor (Slika 8.). Potprogram se sastoji iz dve celine :

- a) PREDIKTORSKI deo
- b) KOREKTORSKI deo

Označimo sa $y_{j,1} = y_j(x_i)$ i $f_{j,1} = f_j(x_i, y_{1,1}, y_{2,1}, \dots, y_{n,1})$

rešenja u prethodnim vremenskim trenucima x_i . Najpre prediktorski deo izračunava nove vrednosti nezavisno promenljive po formuli

$$y_{j,1+1,0} = y_{j,1-3} + \frac{4}{3} \Delta x (2f_{j,1} - f_{j,1-1} + 2f_{j,1-2}) \quad (5.20)$$

$$y_{j,1+1,0}^* = y_{j,1+1,0} + \frac{112}{9} e_{j,1} \quad (5.21)$$

$$e_{j,i} = \frac{9}{121} (y_{j,i+1} - y_{j,i}) \quad j = 1, 2, \dots, n \quad (5.22)$$

Veličine $y_{j,i+1}$ i $y_{j,i+1}^*$ su pomoćne. Nakon izvršene zamene:

$$y_{j,i+1}^* \longrightarrow y_{j,i}$$

poziva se potprogram SISTEM i izračunavaju se nove vrednosti izvoda $f_{j,i}^*$ koje se smeštaju u pomoćne promenljive $f_{j,i+1}^*$

i povećava se vrednost nezavisno promenljive $x_{i+1} = x_i + h$

Na kraju korektorski deo izračunava vrednosti nezavisne promenljive na osnovu formula:

(5.23):

$$y_{j,i+1,1} = \frac{1}{8} [9y_{j,i} - y_{j,i-2} + 3h(f_{j,i+1,0}^* + 2f_{j,i} - f_{j,i-1})]$$

$$e_{j,i+1} = \frac{9}{121} (y_{j,i+1,1} - y_{j,i+1}) \quad j = 1, 2, \dots, n \quad (5.24)$$

$$y_{j,i+1} = y_{j,i+1,1} - e_{j,i+1} \quad j = 1, 2, \dots, n \quad (5.25)$$

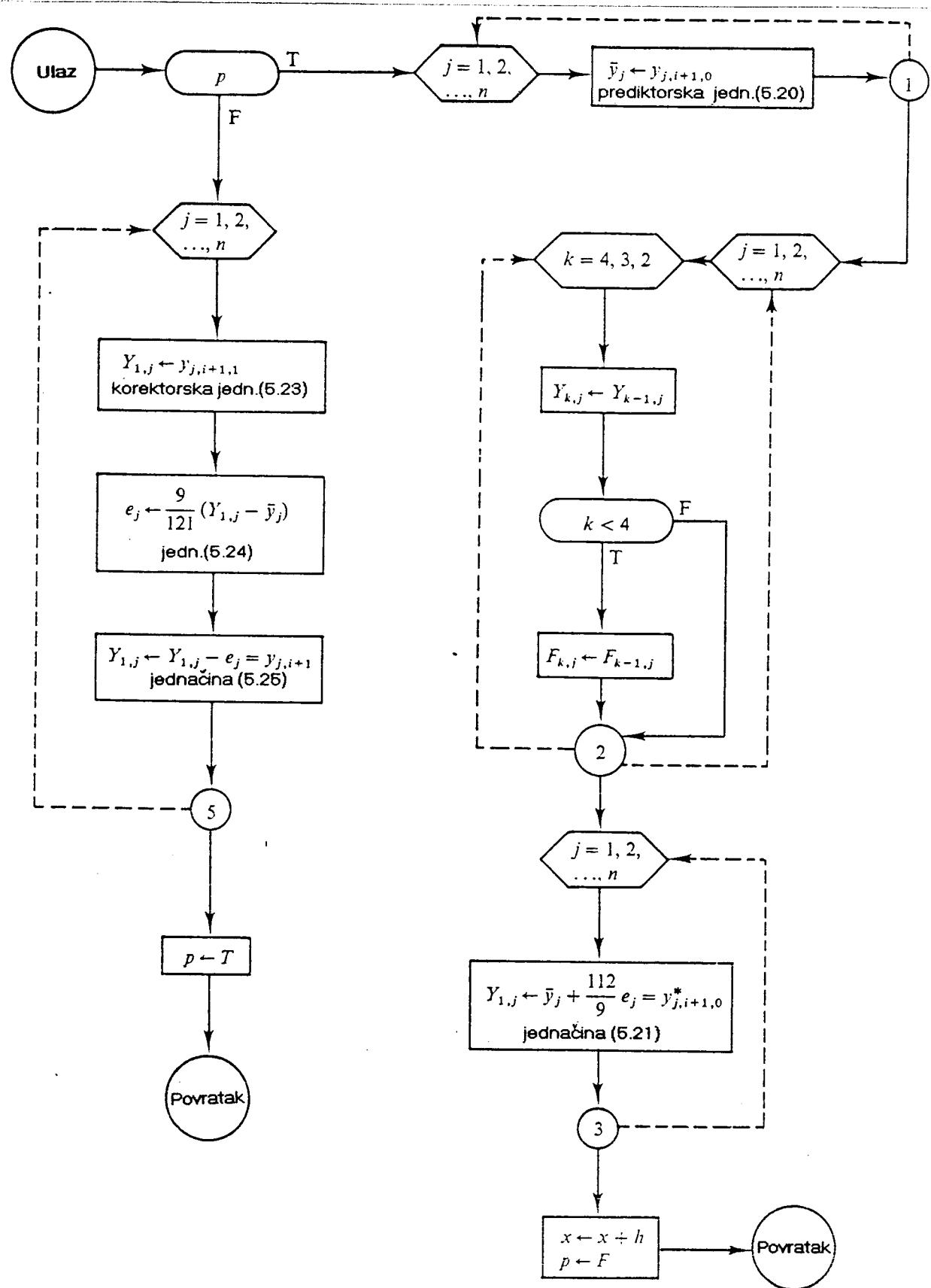
Vrednosti izraza (5.25) predstavljaju vredosti E_1, \dots, E_5, T , i I_{v_0} u vremenskom trenutku $x + h$.

Te vrednosti se i štampaju (smeštaju u datoteku).

Zatim se poziva potprogram SISTEM i izračunavaju se nove vrednosti izvoda. Ceo postupak se ponavlja sve dok se ne pređe ceo interval integracije.

Potprogram PROVERA izračunava energije po formulama (5.9), (5.10), (5.11), (5.12), (5.13).

Slika 8. Predstavljen je tok operacija potprograma HAMING :



REZULTATI

Program je testiran na modelu elektrojonizacionog lasera i lasera sa samostalnim pražnjenjem.

a) Model elektrojonizacionog lasera

Vrednosti ulaznih parametara su:

- 1.) početna vrednost koraka integracije $H = 1 \cdot 10^{-11} \text{ s}$
- 2.) faktor popune $F = 1.0$
- 3.) koeficijent refleksije izlaznog ogledala $R = 0.3$
- 4.) dužina laserske cevi $L = 100 \text{ cm}$
- 5.) poprečni presek laserske cevi $S = 10 \text{ cm}^2$
- 6.) pritisak gasa u laserskoj cevi $P = 1 \text{ atm}$
- 7.) pocetna temperatura $T = 300 \text{ K}$
- 8.) odnos komponenata u smeši $\text{CO}_2 : \text{N}_2 : \text{He} = 1 : 1 : 3$
- 9.) dužina trajanja elektronskog impulsa iznosi $X_E = 0.2 \mu\text{s}$.

Vrednosti brzina elektronskog pobudivanja su (u $\text{cm}^3 \text{s}^{-1}$) :

$$\begin{aligned}X_1 &= 1.2 \cdot 10^{-10} \\X_2 &= 4.8 \cdot 10^{-9} \\X_3 &= 4.8 \cdot 10^{-9} \\X_4 &= 7.0 \cdot 10^{-8} \\X_5 &= 3 \cdot 10^{-8}\end{aligned}$$

Vrednosti vezane za koncentraciju elektrona iznose:

$$\begin{aligned}-\text{brzina generacije sekundarnih elektrona} &S = 1.372 \cdot 10^{19} \text{ cm}^{-3} \text{s}^{-1} \\-\text{koeficijent rekombinacije} &\alpha = 0.28 \cdot 10^{-6} \text{ cm}^3 \text{s}^{-1}\end{aligned}$$

Pretpostavlja se da nema gubitaka tj. $E_{\text{gub}} = 0$

Grafički su obradene promene najvažnijih veličina :

- a) Temeratura $T_1, T_2, T_3, T_4, T_5, T$
- b) Koncentracije elektrona $N_e(t)$ (po cm^{-3})
- c) Laserskog impulsa kao funkciju $P(t)$
- d) Koeficijenta pojačanja aktivne sredine

Vrednost koncentracije elektrona je data po cm^3 .

Početna vrednost translatorne energije (jedn. 5.9) iznosi:

$$E_{tr}^i = 191.924 \text{ J}$$

Početna vrednost vibracione energije (jedn. 5.10) iznosi:

$$E_{(v)}^i = 5.666 \text{ J}$$

Nakon vremena $t = 6.0 \mu\text{s}$ vrednosti su sledeći :

Vrednost translatorne energije iznosi :

$$E_{tr}^f = 195.455 \text{ J}$$

Vrednost vibracione energije iznosi :

$$E_{(v)}^f = 16.670 \text{ J}$$

Vrednost uložene elektronske energije (jedn. 5.11) iznosi :

$$E_u = 18.550 \text{ J}$$

Vrednost izračene energije (5.12) iznosi :

$$E_{izl} = 2.748 \text{ J}$$

Ukupna početna plus uložena energija iznosi:

$$E_{uk}^i = E_{tr}^i + E_{(v)}^i + E_u = 191.924 \text{ J} + 5.666 \text{ J} + 18.550 \text{ J} = 216.140 \text{ J}$$

Ukupna konačna plus izlazna energija iznosi:

$$E_{uk}^f = E_{tr}^f + E_{(v)}^f + E_{izl} = 195.455 \text{ J} + 16.670 \text{ J} + 2.748 \text{ J} = 214.873 \text{ J}$$

Prema zakonu održanja energije (jedn 5.8) razlika između početne i krajnje vrednosti energije iznosi :

$$\Delta E = 1.267 \text{ J}$$

što u odnosu na uloženu energiju E_u iznosi :

$$\delta E = 6.8 \%$$

Koefficijent pojačanja aktivne sredine (jedn.3.26) iznosi:

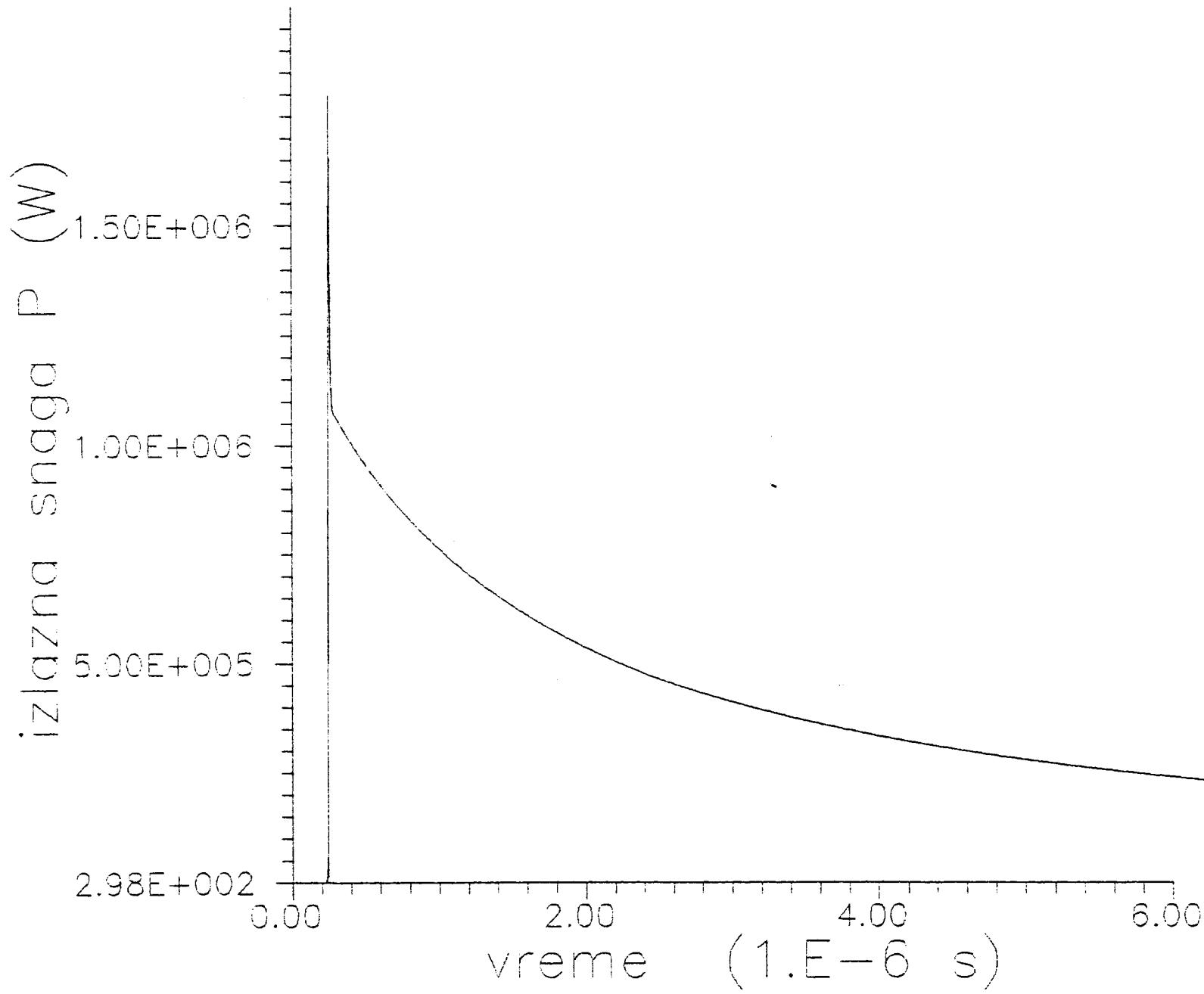
$$\alpha = 0.6 \cdot 10^{-2} \text{ cm}^{-1}$$

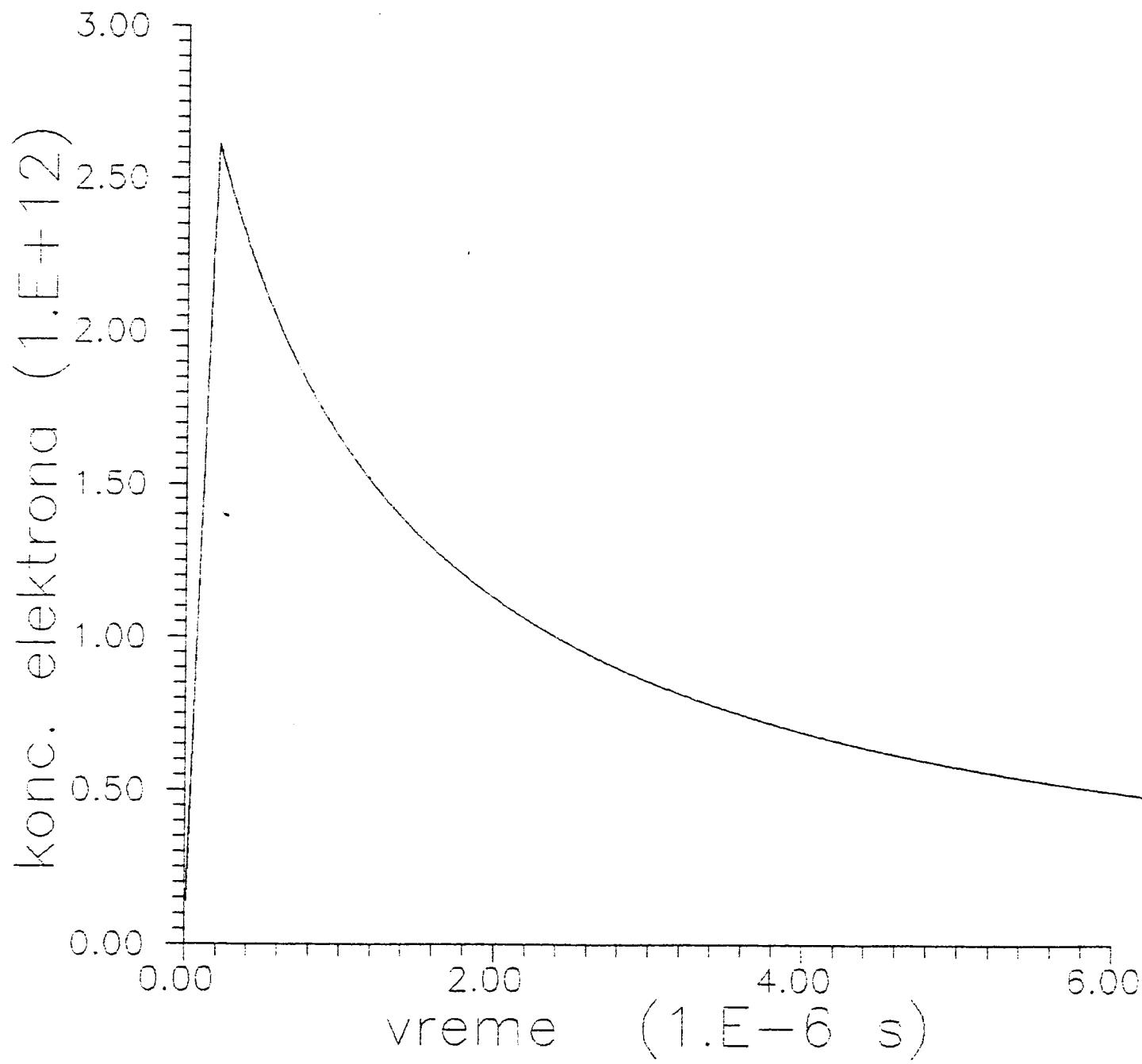
Eksperimentalno dobijena vrednost iznosi:

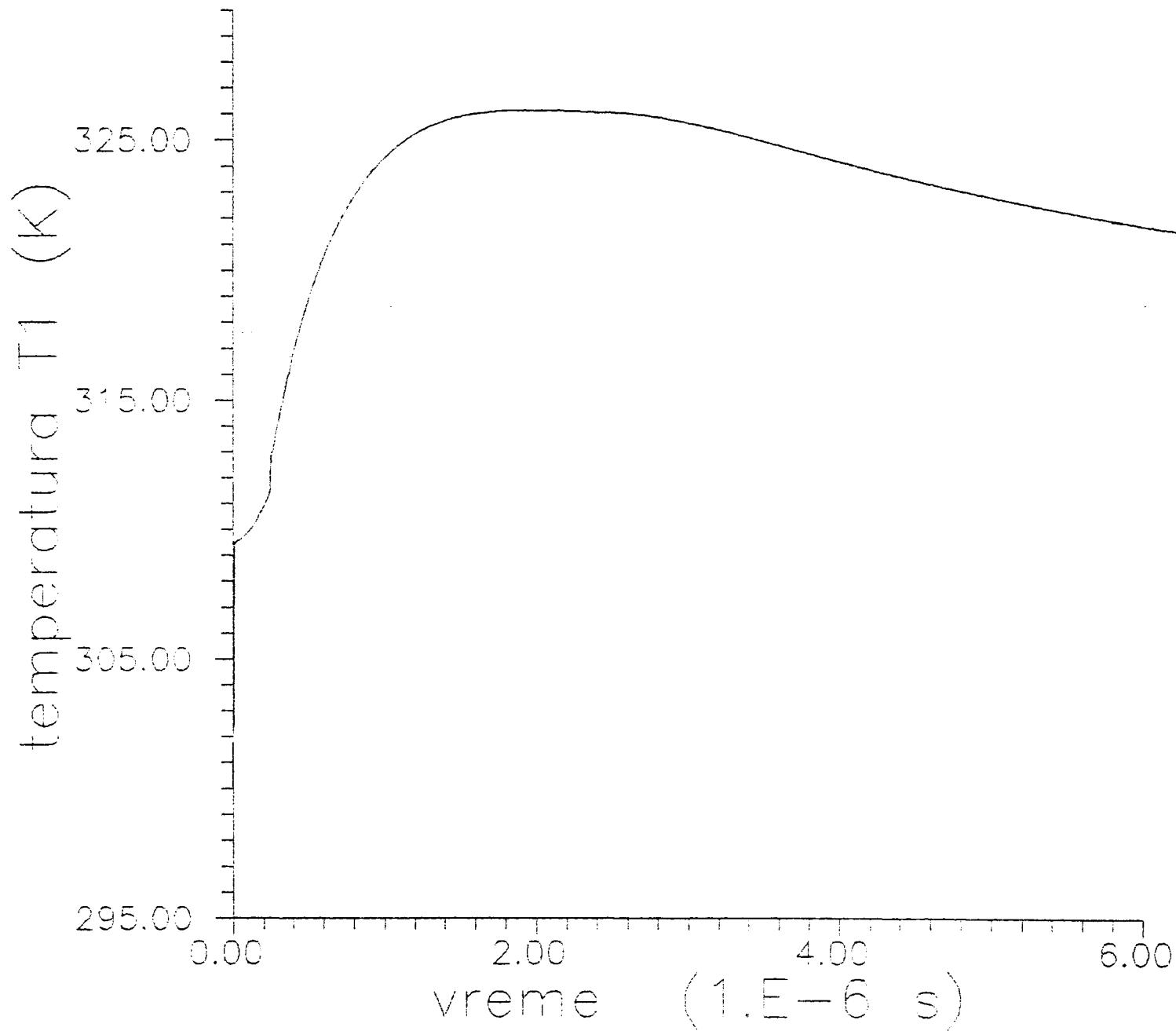
$$\alpha_{\text{exp}} \approx 0.58 \cdot 10^{-2} \text{ cm}^{-1}$$

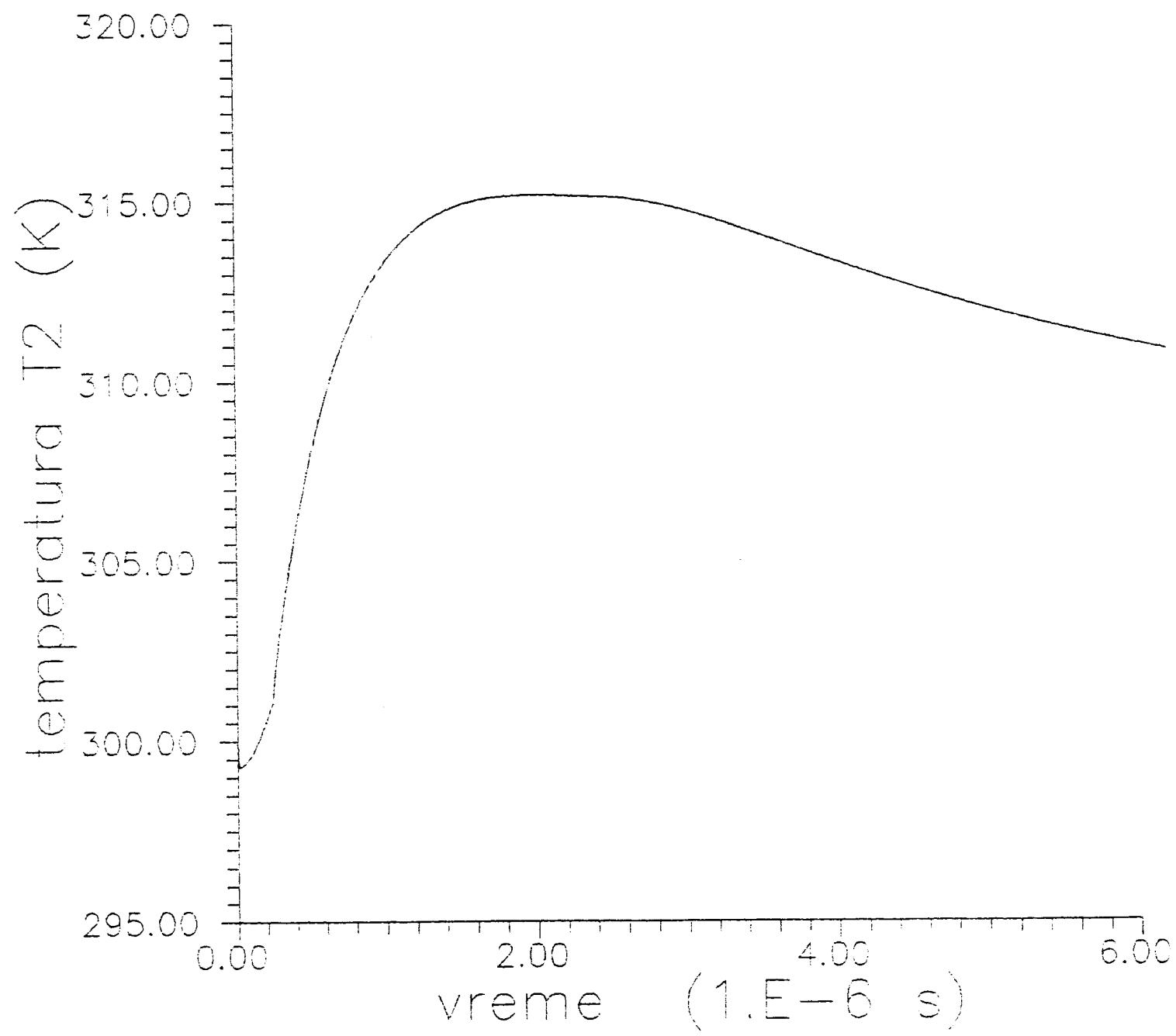
Možemo proceniti i koeficijent korisnog dejstva lasera kao:

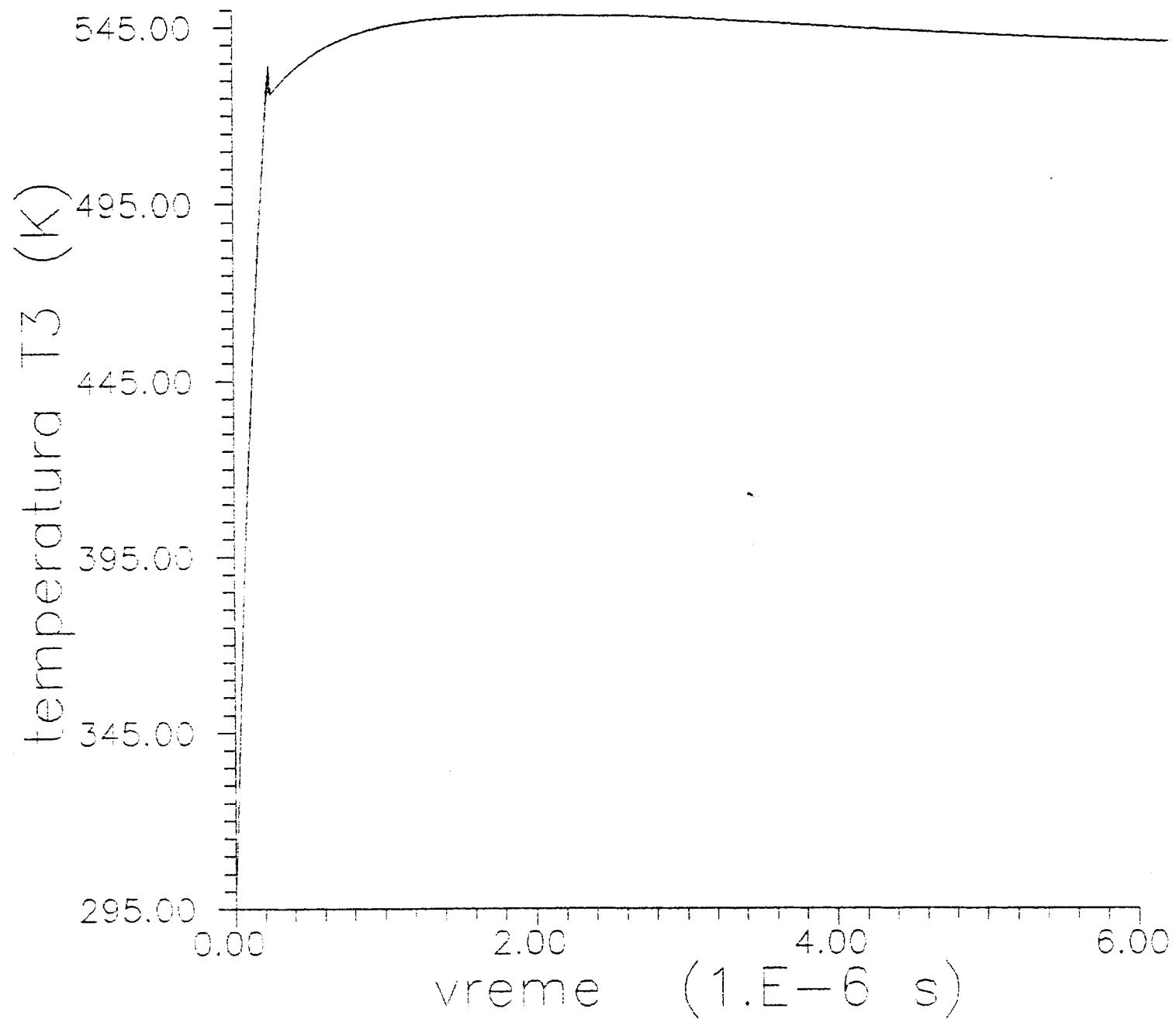
$$\eta = E_{\text{izl}} / E_u \approx 15 \%$$

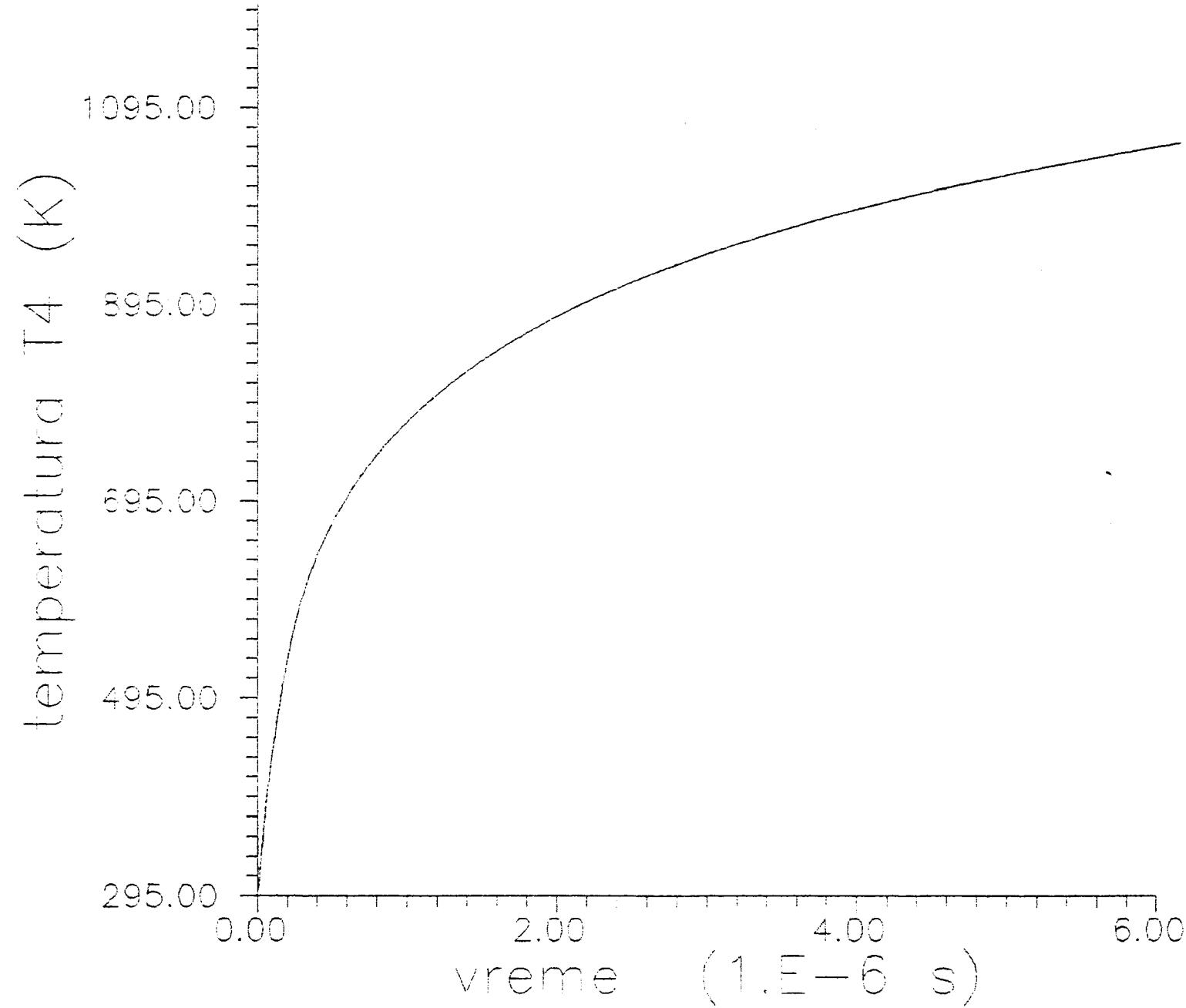


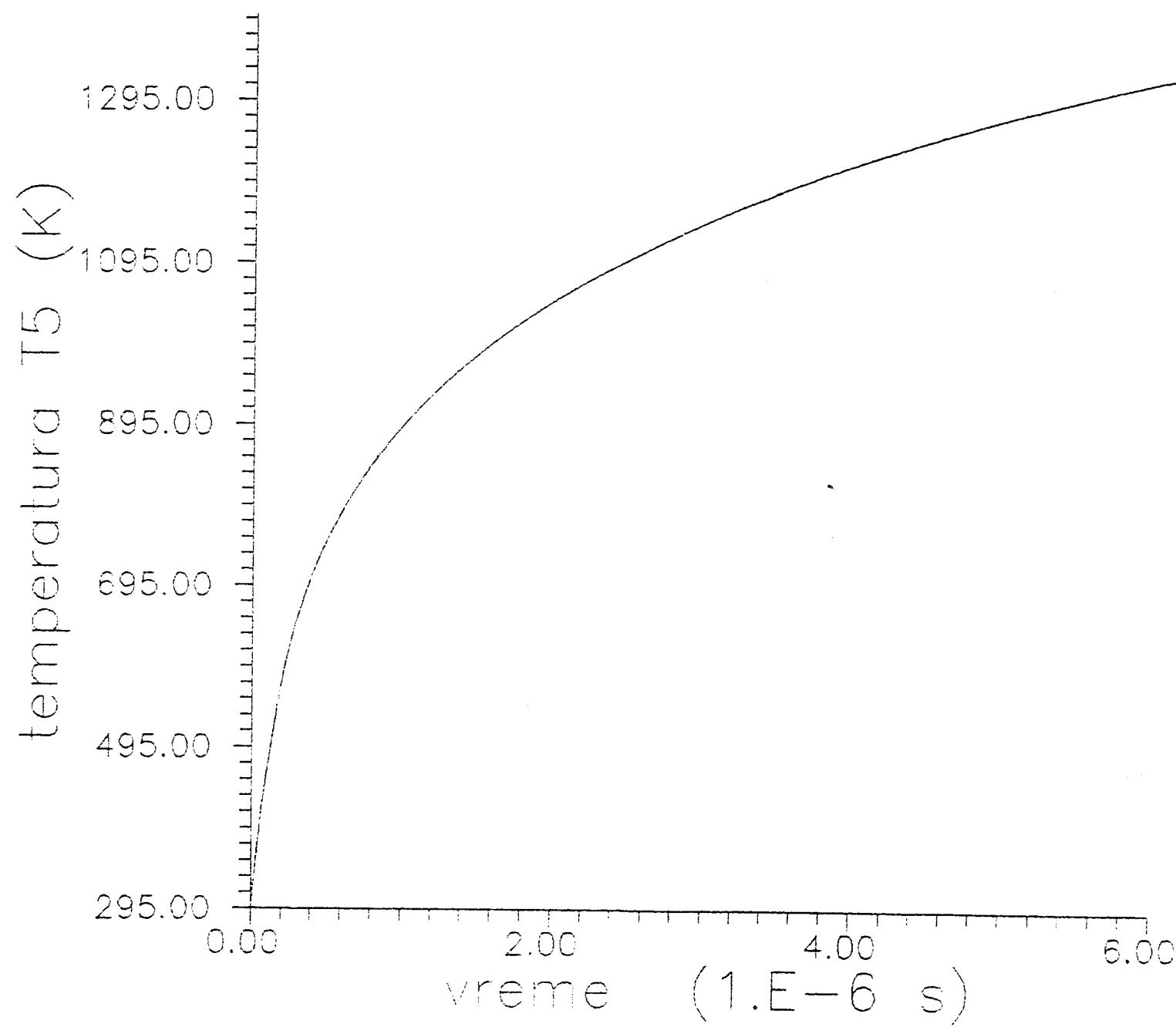


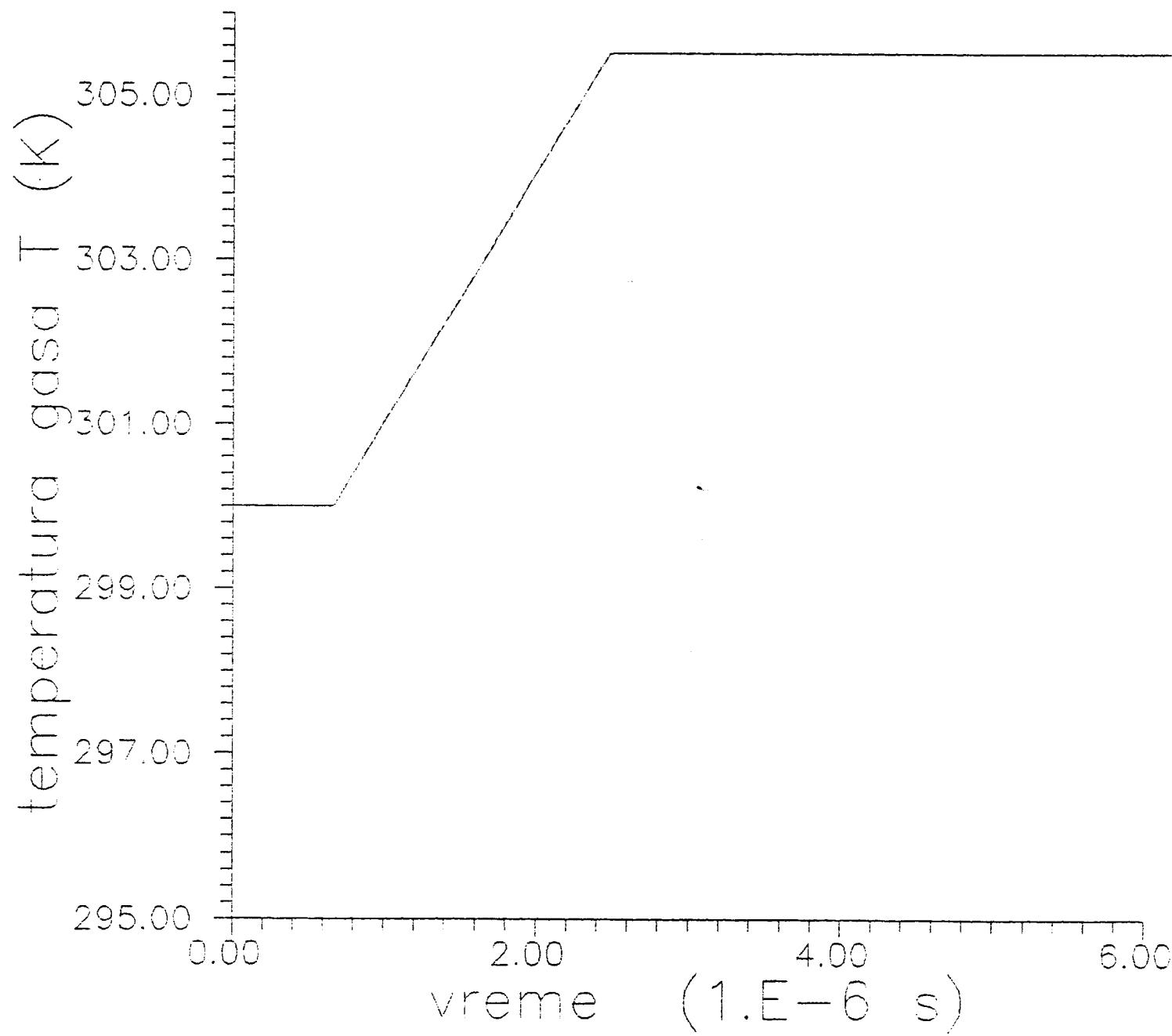












a) Model lasera sa samostalnim pražnjenjem

Vrednosti ulaznih parametara su:

- 1.) početna vrednost koraka integracije $H = 1 \cdot 10^{-11} \text{ s}$
- 2.) faktor popune $F = 0.71$
- 3.) koeficijent refleksije izlaznog ogledala $R = 0.85$
- 4.) dužina laserske cevi $L = 28 \text{ cm}$
- 5.) površinski presek laserske cevi $S = 5.7 \text{ cm}^2$
- 6.) pritisak gasa u laserskoj cevi $P = 1 \text{ atm}$
- 7.) pocetna temperatura $T = 300 \text{ K}$
- 8.) odnos komponenata u smeši $\text{CO}_2 : \text{N}_2 : \text{He} = 2 : 1 : 6$

Vrednosti brzina elektronskog pobudivanja su (u $\text{cm}^3 \text{s}^{-1}$) :

$$\begin{aligned}x_1 &= 5 \cdot 10^{-10} \\x_2 &= 8 \cdot 10^{-9} \\x_3 &= 5.5 \cdot 10^{-9} \\x_4 &= 2.3 \cdot 10^{-8} \\x_5 &= 3 \cdot 10^{-8}\end{aligned}$$

Pretpostavlja se da nema gubitaka tj. $E_{\text{gub}} = 0$

Grafički su obradene promene najvažnijih veličina :

- a) Temeratura $T_1, T_2, T_3, T_4, T_5, T$
- b) Koncentracije elektrona $N_e(t)$ (po cm^{-3})
- c) Laserskog impulsa kao funkciju $P(t)$
- d) Koeficijenta pojačanja aktivne sredine

Vrednost koncentracije elektrona je data po cm^3 .

Početna vrednost translatorne energije (jedn. 5.9) iznosi:

$$E_{\text{tr}}^1 = 29.556 \text{ J}$$

Početna vrednost vibracione energije (jedn. 5.10) iznosi:

$$E_{(v)}^1 = 1.005 \text{ J}$$

Nakon vremena $t = 6.0 \mu\text{s}$ vrednosti su sledeći :

Vrednost translatorne energije iznosi :

$$E_{tr}^f = 31.546 \text{ J}$$

Vrednost vibracione energije iznosi :

$$E_{(v)}^f = 5.956 \text{ J}$$

Vrednost uložene elektronske energije (jedn. 5.11) iznosi :

$$E_u = 7.854 \text{ J}$$

Vrednost izračene energije (5.12) iznosi :

$$E_{izl} = 0.924 \text{ J}$$

Ukupna početna plus uložena energija iznosi:

$$E_{uk}^1 = E_{tr}^1 + E_{(v)}^1 + E_u = 29.556 \text{ J} + 1.005 \text{ J} + 7.854 \text{ J} = 38.415 \text{ J}$$

Ukupna konačna plus izlazna energija iznosi:

$$E_{uk}^f = E_{tr}^f + E_{(v)}^f + E_{izl} = 31.546 \text{ J} + 5.956 \text{ J} + 0.924 \text{ J} = 38.426 \text{ J}$$

Prema zakonu održanja energije (jedn 5.8) razlika između početne i krajnje vrednosti energije iznosi :

$$\Delta E = 0.011 \text{ J}$$

što u odnosu na uloženu energiju E_u iznosi :

$$\delta E = 0.14 \%$$

Koefficijent pojačanja aktivne sredine (jedn. 3.26) iznosi:

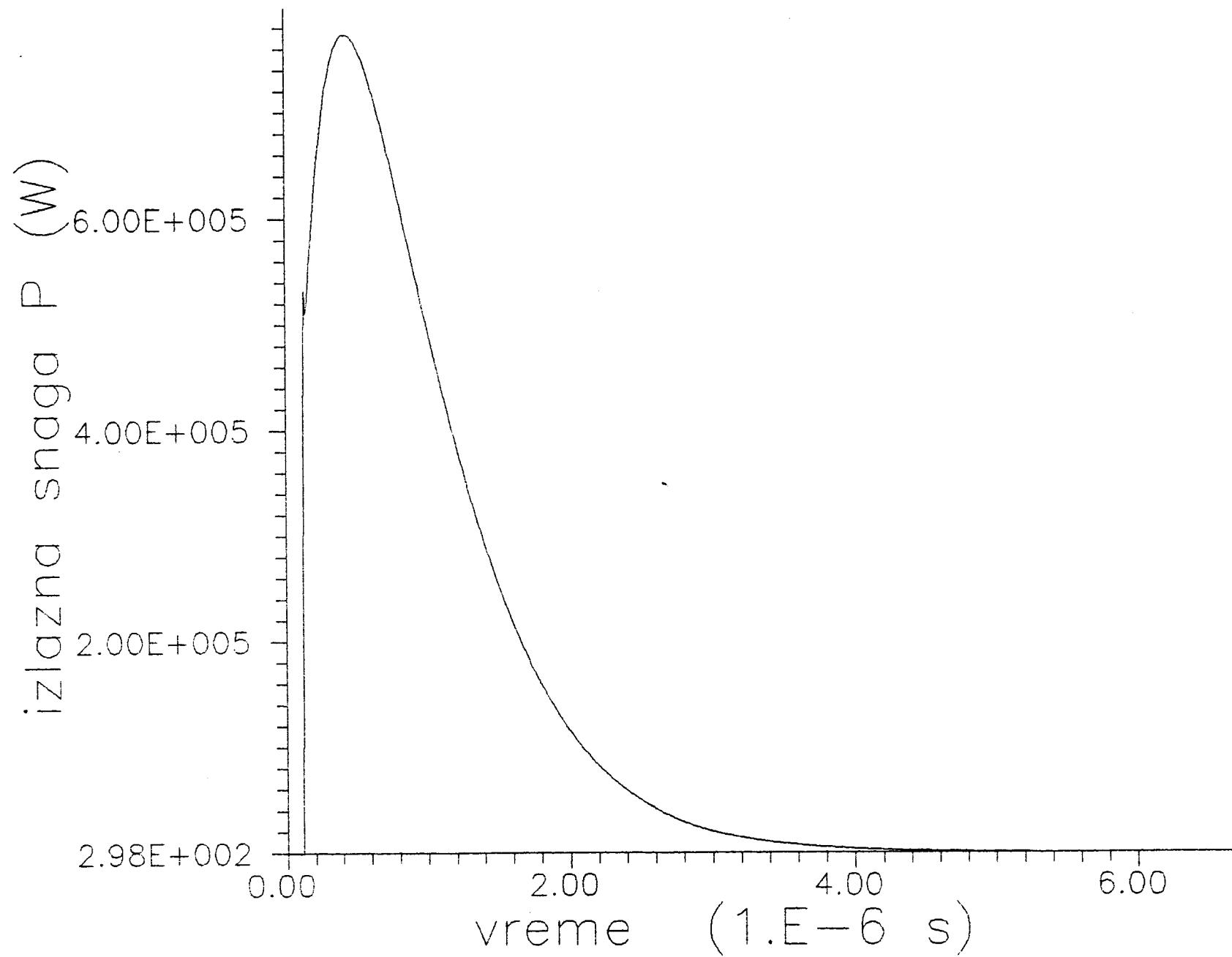
$$\alpha = 0.41 \cdot 10^{-2} \text{ cm}^{-1}$$

Eksperimentalno dobijena vrednost iznosi:

$$\alpha_{exp} \approx 0.4 \cdot 10^{-2} \text{ cm}^{-1}$$

Možemo proceniti i koeficijent korisnog dejstva lasera kao:

$$\eta = E_{izl} / E_u \approx 12 \%$$



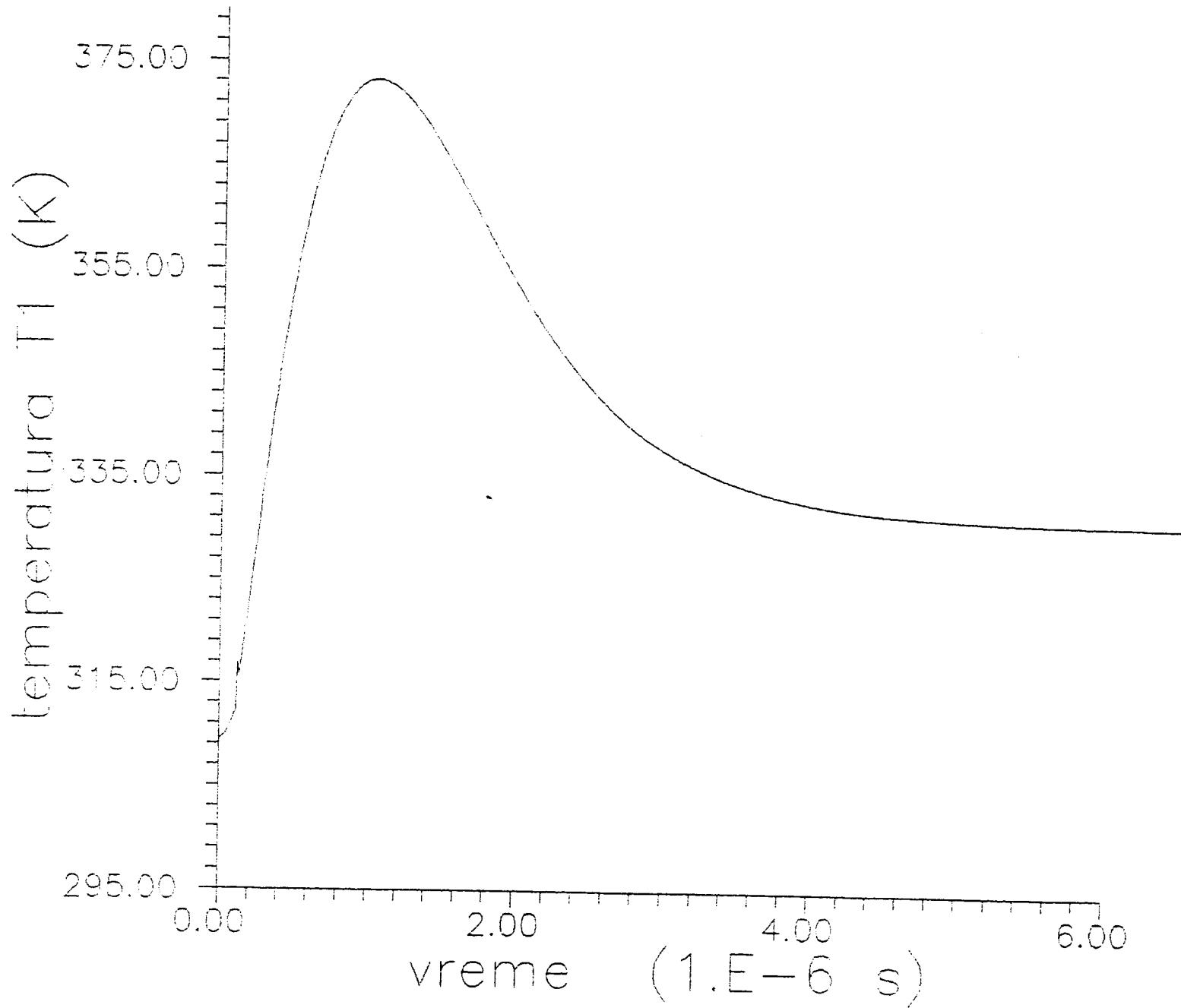
konc. elektrona (1.E+12)

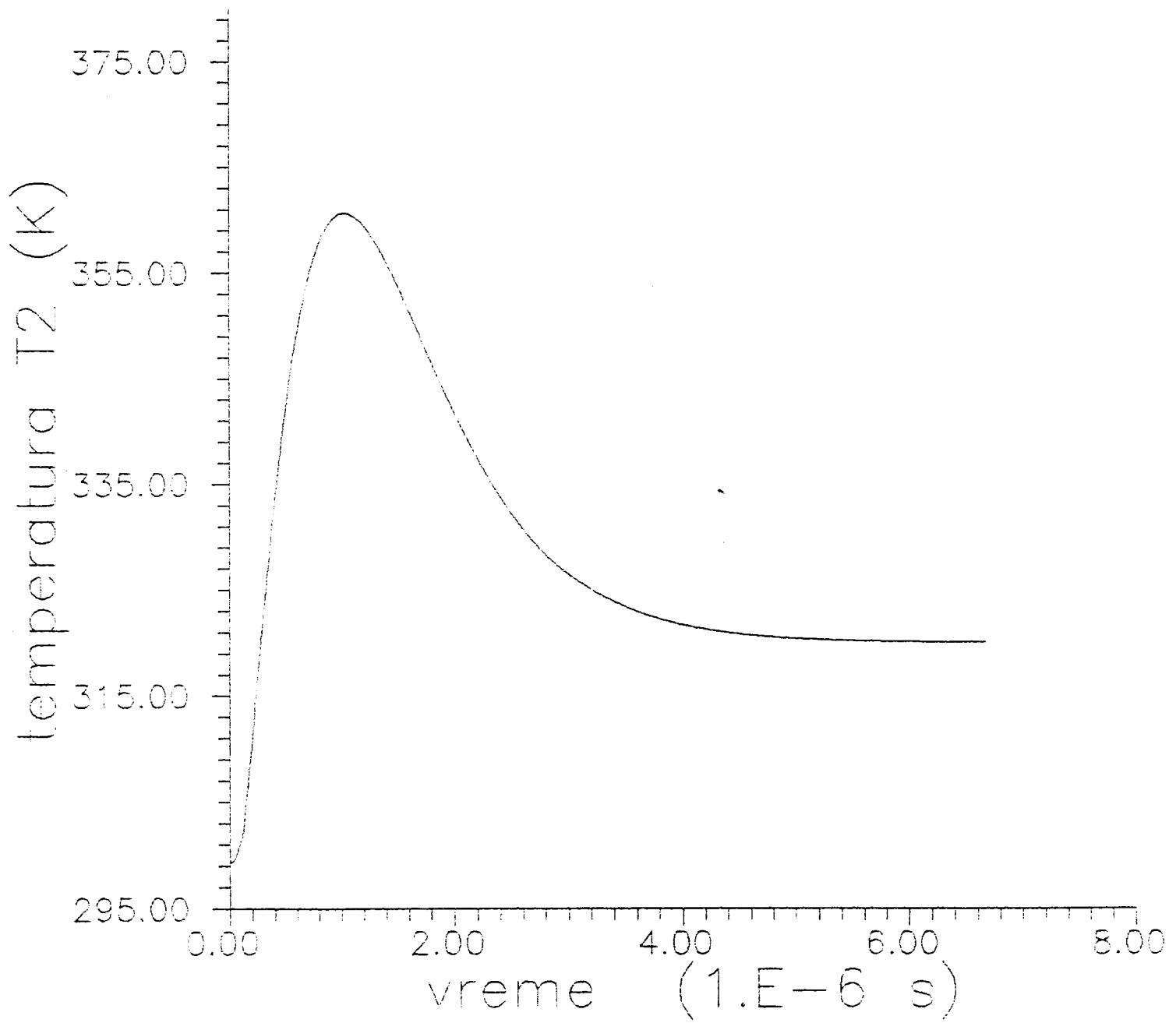
10.00
8.00
6.00
4.00
2.00
0.00

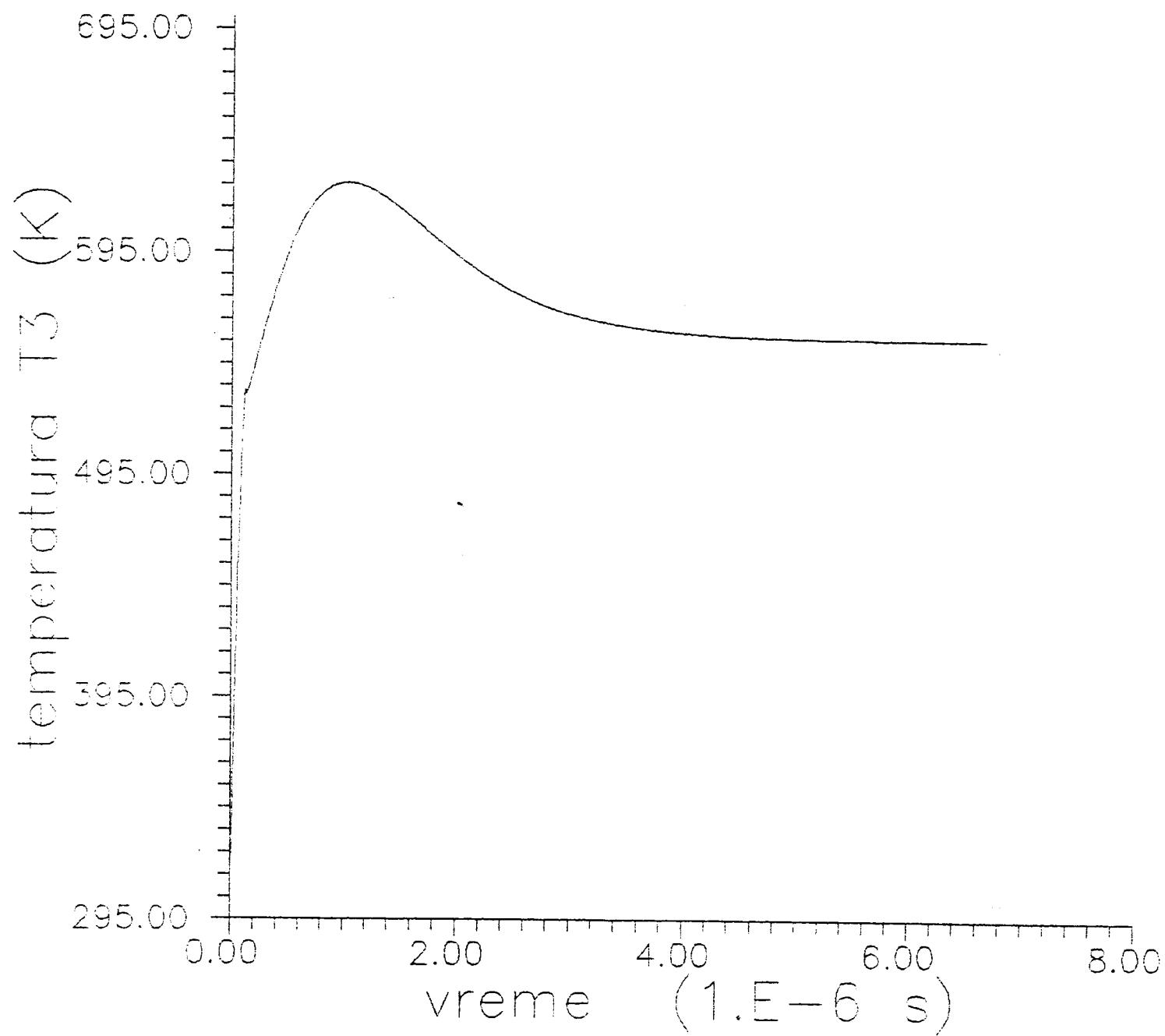
vreme (1.E-6 s)

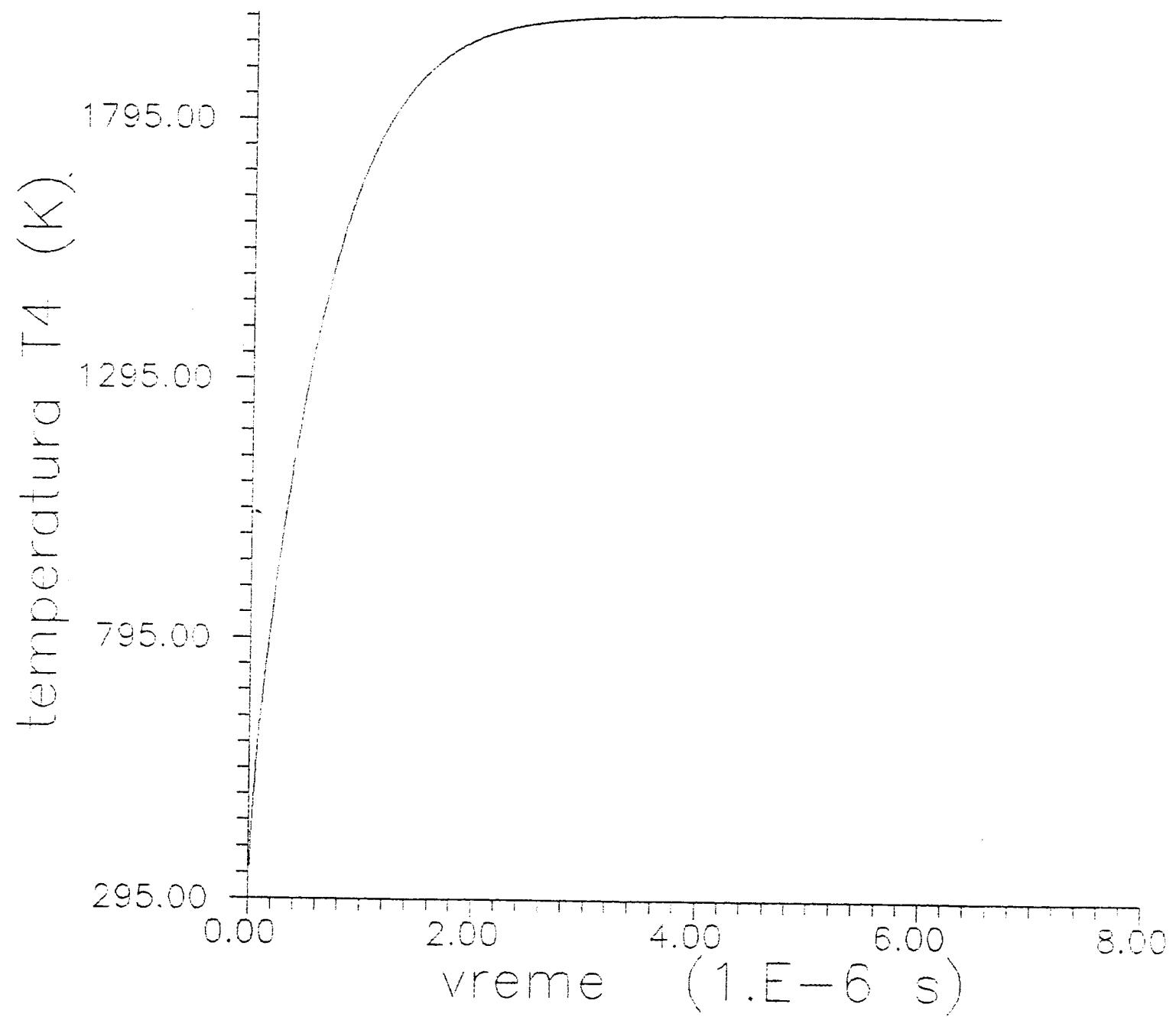
4.00
2.00
0.00

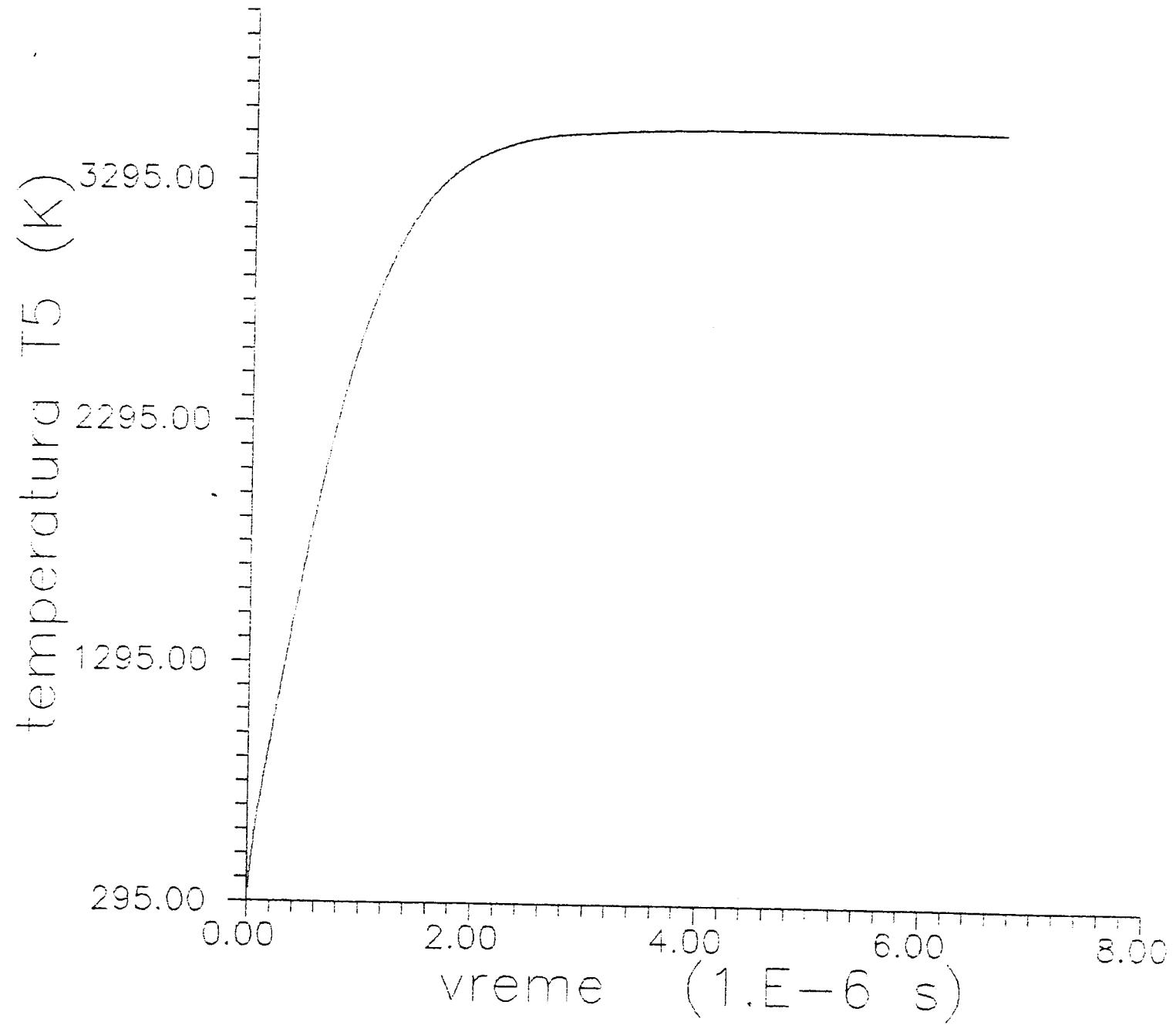
6.00

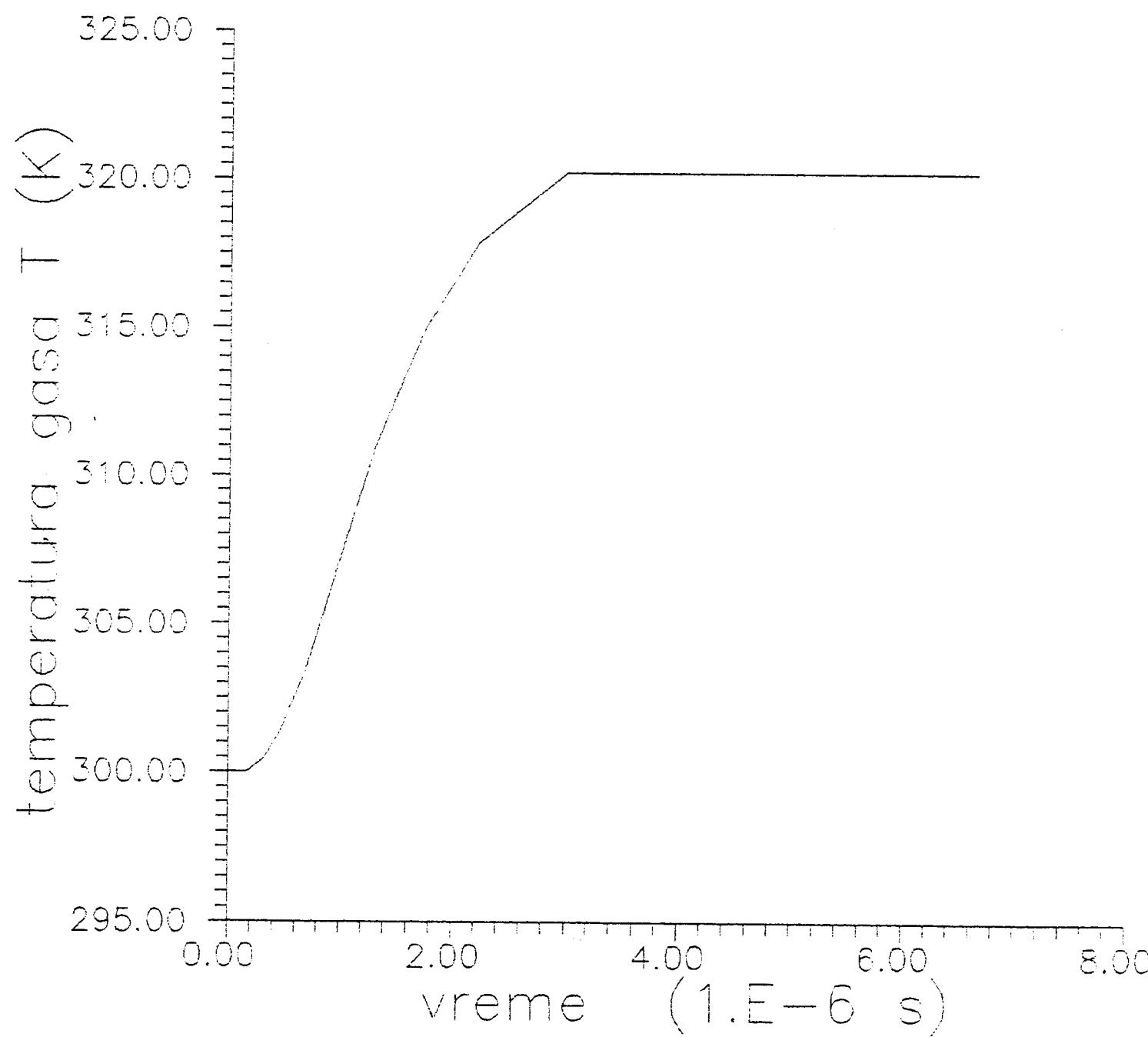












ZAKLJUČAK

Proverom zakona održanja energije vidimo da postoji relativno dobra saglasnost kod elektrojonizacionog, i veoma dobra saglasnost kod lasera sa samostalnim pražnjjenjem.

Izvori grešaka su višestruki:

- neuzimanje u obzir svih procesa relaksacija navedenih na kraju četvrtoog poglavlja
- korak integracije. Svaka numerička metoda ima "boljku" da je veoma teško odrediti optimalni korak. To je pitanje iskustva. Premali korak znači smanjenje greške po jednoj iteraciji, ali i veliki broj iteracija tako da se sumarno greška povećava. Preveliki korak znači manji broj iteracija, ali i veću grešku po iteraciji, a može doći i do divergencije.
- Izračunavanje integralnog toka elektrona i izračene energije jer se moraju izračunavati integrali. Oblik elektronskog impulsa kod elektrojonizacionog lasera ima oštar vrh i tu leži veliki izvor greške.

To su glavni izvori grešaka od kojih je najveći poslednji izvor. Prvi izvor bi bio uočljiv kada bih imao realizovan laser sa izmerenim karakteristikama, i te karakteristike uporedio sa izračunatim.

U principu oblici laserskog impulsa su u saglasnosti sa praksom. Faktori pojačanja takođe.

Problemi nastaju oko funkcije elektronske gustine. U praksi se ta funkcija odreduje praktično, preko promene jačine struje kroz gasnu smešu. Ja sam koristio teorijski dobijene funkcije tako da je odstupanje od realnog modela moguće. Isto važi i za brzine elektronske pobude x_1, \dots, x_5 .

Literatura koja obraduje konkretne probleme iz ove oblasti mi je bila nedostupna jer je skoro i nema kod nas.

Jedna opaska sa praktične strane:

PC računari koje sam koristio u proračunima a to su AT 286/287 i AT 386/387 su spori za poslove ovakve vrste. Naprimjer : za proračun na intervalu od 0 - 6 μ s , računar AT 286/287 je potrošio oko 14 časova. U slučaju AT 386/387 vreme proračuna se smanjuje za oko 15 % što i nije neko veliko ubrzanje. Zbog toga preporučujem izvršavanje programa na većim sistemima kao što su VAX, DEC, PDP,...

Mislim da je ovako koncipiran model dobra osnova za dalju razradu jer vremenske zavisnosti vibracionih temperatura, snage zračenja i koncentracije elektrona kao i njihovi brojčani iznosi su prihvatljive. Trebalo bi više raditi na funkciji koja opisuje promenu elektronske koncentracije u vremenu , jer ona ima najveći udio u generisanju greške. Sam metod rešavanja sistema dif. jednačina je po mom mišljenju veoma dobar jer su greške računanja relativno male.

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Microsoft Corporation 1987. - 1989.
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- 8.) A. Čurlin : Programske alati u matematici
Institut za nuklearne nauke " Boris Kidrič " Vinča 1990.

DODATAK

PROGRAM LASER

```

PROGRAM GLAVNI
C
C      EXTERNAL SYSTEM
C
C      INTEGER COUNT,HAMING
C
C      DIMENSION YR(20),TE(20),FR(20),Y(4,20),F(3,20),Y1ZL(20)
C
C      COMMON /S1/ ZCO2,ZN2,ZRE,ZCO,TEMP
C
C      COMMON /S2/ R,PT,VCEV,SCEV
C
C      COMMON /S3/ FPOP,DCEV
C
C      COMMON /S4/ T1,T2,T3,T4,T5
C
C      COMMON /S5/ X1,X2,X3,X4,X5
C
C      DOUBLE PRECISION YR,FR,F,Y,TE,Y1ZL
C
C      N=7
C
C      X=0.0
C
C      XMAX=1.E-4
C
C      INT=1000
C
C      PI=3.1415
C
C      Unos vrednosti:
C
      WRITE(*,10)
10   FORMAT(3X,'Unesi vrednost pocetnog koraka integracije H(s)='$)
      READ (*,180)H
      WRITE(*,20)
20   FORMAT(3X,'Unesi vrednost faktora popune FPOP='$)
      READ (*,180)FPOP
      WRITE(*,30)
30   FORMAT(3X,'Unesi vrednost faktora refleksije R='$)
      READ (*,180)R
      WRITE(*,40)
40   FORMAT(3X,'Unesi udeo molekula CO2 koji nije disocirao FC02='$)
      READ (*,180)FC02
      WRITE(*,50)
50   FORMAT(3X,'Unesi pocetnu vrednost temperature TEMP(K)='$)
      READ (*,180)TEMP
      WRITE(*,60)
60   FORMAT(3X,'Unesi vrednost pritiska u gasnoj cevi PRIT(atm)='$)
      READ (*,180)PRIT

```

```

      WRITE(*,70)
70   FORMAT(3X,'Unesi duzinu gasne cevi DCBV(cm)=',\$)
      READ (*,180)DCBV
      WRITE(*,80)
80   FORMAT(3X,'Unesi poprecni presek gasne cevi SCEV(cm2)=',\$)
      READ (*,180)SCEV
      WRITE(*,90)
90   FORMAT(3X,'Unesi udio uglijen-dicksida u gasnoj smesi ACO2=',\$)
      READ (*,180)ACO2
      WRITE(*,100)
100  FORMAT(3X,'Unesi udio azota u gasnoj smesi AN2=',\$)
      READ (*,180)AN2
      WRITE(*,110)
110  FORMAT(3X,'Unesi udio helijuma u gasnoj smesi AHE=',\$)
      READ (*,180)AHE
      WRITE(*,120)
120  FORMAT(3X,'Unesi duzini trajanja elektronskog impulsa XE(s)=',\$)
      READ (*,180)XE
      WRITE(*,130)
130  FORMAT(3X,'Unesi brzinu elektronske pobude X1=',\$)
      READ (*,180)X1
      WRITE(*,140)
140  FORMAT(3X,'Unesi brzinu elektronske pobude X2=',\$)
      READ (*,180)X2
      WRITE(*,150)
150  FORMAT(3X,'Unesi brzinu elektronske pobude X3=',\$)
      READ (*,180)X3
      WRITE(*,160)
160  FORMAT(3X,'Unesi brzinu elektronske pobude X4=',\$)
      READ (*,180)X4
      WRITE(*,170)
170  FORMAT(3X,'Unesi brzinu elektronske pobude X5=',\$)
      READ (*,180)X5
180  FORMAT(G12.6)

C
C   Izracunavanje broja molekula uglijen-dicksida,azota,helijuma :
C
      VCEV=DCBV*SCEV
C
      A=((0.101*VCEV*PRIT)/(TEMP*8.31))**6.0225623
C
      ZCO2=(ACO2-A)/((ACO2+AN2+AHE)*VCEV)
C
      ZN2=(AN2-A)/((ACO2+AN2+AHE)*VCEV)
C
      ZHE=(AHE-A)/((ACO2+AN2+AHE)*VCEV)
C
      ZCO=(1.-FCO2)*ZCO2
C
      ZCO2=FCO2*ZCO2
C
      Z=(1.-EXP(-1997./TEMP))**((1.-EXP(-960./TEMP))**2.)**
      *(1.-EXP(-3380./TEMP))
C

```

```

C Izracunavanje pocetne vrednosti kinetičke energije:
C
C EKINO=(2.5*(ZCO2+ZN2)+1.5*(ZHE+ZCO)) * 1.38E-23*TEMP
C
C Izracunavanje pocetnih vrednosti zavisno promenljivih:
C
C E1=2.76E-13*ZCO2/(EXP(1998.4/TEMP)-1.)
C
C E2=2.*1.326E-13*ZCO2/(EXP(960.6/TEMP)-1.)
C
C E3=4.6/E-13*ZCO2/(EXP(3382./TEMP)-1.)
C
C E4=4.03E-13*ZN2/(EXP(3354./TEMP)-1.)
C
C E5=4.273E-13*ZCO/(EXP(3095.5/TEMP)-1.)
C
C Izracunavanje pocetne vibracione energije:
C
C EVIBO=(E1+E2+E3+E4+E5)*1.E-7
C EELEK0=0.
C EIZL0=0.
C PIZL0=0.
C
C Inicijalizacija globalnih promenljivih:
C
C YR(1)=0.0
C
C YR(2)=E1
C
C YR(3)=E2
C
C YR(4)=E3
C
C YR(5)=E4
C
C YR(6)=E5
C
C YR(7)=TEMP
C
C Otvaranje datoteka za upis rezultata:
C
C OPEN(1,FILE='TEMPER.REZ', STATUS='UNKNOWN')
C OPEN(2,FILE='ENERGIJE.REZ', STATUS='UNKNOWN')
C OPEN(3,FILE='PROVERA.REZ', STATUS='UNKNOWN')
C
C Upis pocetnih vrednosti energija u datoteku:
C
C WRITE(*,11) X*1.E6,EKINO,EVIBO,EELEKO,EIZL0,PIZL0
C WRITE(3,11) X*1.E6,EKINO,EVIBO,EELEKO,EIZL0,PIZL0
C
C Izracunavanje pocetnih vrednosti izvoda FR(J):
C
C CALL SISTEM(X,XE,YR,FR,ELEC,DELN,DELFR)

```

```

C Inicijalizacija brojaca, prve vrste Y-matrice, gresaka TE(J):
C
C COUNT=0
DO 2 J=1,N
TE(J)=0.
Y(4,J)=YR(J)
CONTINUE
Z
C
C Poziv potprograma RUNGE, i racunanje vrednosti YR(J) i FR(J)
C na prva tri vremenska koraka:
C
C 3 CALL RUNGE(N,YR,FR,X,H,YIZL,SISTEM)
GO TO 4
C
C Formiranje Y i F matrice:
C
C 4 COUNT=COUNT+1
ISUB=4-COUNT
CALL SISTEM(X,XE,YIZL,FR,ELEC,DELN,DELFR)
DO 5 J=1,N
Y(ISUB,J)=YIZL(J)
F(ISUB,J)=FR(J)
YR(J)=YIZL(J)
CONTINUE
C
C Stampaanje resenja posle svakog koraka:
C
C 6 IF(COUNT/INT*INT .NE. COUNT) GO TO 7
C
IF(COUNT .LE. 3) THEN
C
WRITE(*,9) X*1.E6,T1,T2,T3,T4,T5,TEMP
WRITE(*,11) X*1.E6,EKIN,EVIB,EELEK,EIZL,PIZL
WRITE(*,13) X*1.E6,DELN,DELFR,7.1E-6*DELN/DELFR,ELEC*1.E-12
C
WRITE(1,9) X*1.E6,T1,T2,T3,T4,T5,TEMP
WRITE(2,11) X*1.E6,EKIN,EVIB,EELEK,EIZL,PIZL
WRITE(3,13) X*1.E6,DELN,DELFR,7.1E-6*DELN/DELFR,ELEC*1.E-12
C
ENDIF
C
IF(COUNT .GT. 3) THEN
C
WRITE(*,9) X*1.E6,T1,T2,T3,T4,T5,TEMP
WRITE(*,11) X*1.E6,EKIN,EVIB,EELEK,EIZL,PIZL
WRITE(*,13) X*1.E6,DELN,DELFR,7.1E-6*DELN/DELFR,ELEC*1.E-12
C
WRITE(1,9) X*1.E6,T1,T2,T3,T4,T5,TEMP
WRITE(2,11) X*1.E6,EKIN,EVIB,EELEK,EIZL,PIZL
WRITE(3,13) X*1.E6,DELN,DELFR,7.1E-6*DELN/DELFR,ELEC*1.E-12
C
ENDIF
C

```

```

C Ako je predjen ceo interval, postupak resavanja je zavrsen:
C
7 IF(X.GT.XMAX-H/2.) GO TO 1
C
C Izbor RUNGE ili HEMING-a radi integracije na sledecem koraku:
C
C IF(COUNT.LT.3) GO TO 3
C
C Poziv HEMING-a:
C
3 M=HAMING(N,Y,F,X,H,TE)
C
DO 75 J=1,N
YR(J)=Y(1,J)
CONTINUE
75
C Poziv potprograma SISTEM da bi izracunao nove vrednosti FR(J):
C
CALL SISTEM(X,XE,YR,FR,ELEC,DELN,DELFR)
C
DO 85 J=1,N
Y(1,J)=YR(J)
F(1,J)=FR(J)
CONTINUE
85
IF(M.EQ.1) GO TO 8
C
C Poziv potprograma PROVERA:
C
CALL PROVERA(H,ELEC,YR,EKIN,EVJB,EELEK,EIZL,PIZL)
C
C Inkrementiranje brojaca i nastavak integraljenja:
C
COUNT=COUNT+1
GO TO 6
C
C Formati ispisa:
C
9 FORMAT(2X,F5.2,2X,F7.2,2X,F7.2,2X,F7.2,2X,F7.2,2X,F7.2)
11 FORMAT(2X,F5.2,2X,F10.8,2X,G10.4,2X,G10.4,2X,G10.4,2X,G10.4)
13 FORMAT(2X,F5.2,2X,G10.4,2X,G10.4,2X,G10.4,2X,F8.6)
C
C Zatvaranje datoteka sa rezultatima:
C
1 CLOSE (1)
CLOSE (2)
CLOSE (3)
END
C*****
```

```

SUBROUTINE RUNGE(N,YR,FR,X,H,YIZL,SISTEM)
C
C      DOUBLE PRECISION FR,YR,FZ,Y2,F3,YIZL
C
C      DIMENSION YR(20),FR(20),Y2(20),FZ(20),F3(20),YIZL(20)
C
C
H2=H/2.
H6=H/6.
X2=X+H2
C
C      Izracunavanje izvoda na pocetku intervala:
C
DO 1 I=1,N
C
      Y2(I)=YR(I)+H2*FR(I)
C
1 CONTINUE
C
CALL SISTEM(X2,XE,Y2,FZ,ELEC,DELN,DELFR)
C
C      Izracunavanje izvoda dva puta na polovini intervala:
C
DO 2 I=i,N
C
      Y2(I)=YR(I)+H2*FZ(I)
C
2 CONTINUE
C
CALL SISTEM(X2,XE,Y2,F3,ELEC,DELN,DELFR)
C
C      DO 3 I=1,N
C
      Y2(I)=YR(I)+H2*F3(I)
C
      F3(I)=FZ(I)+F3(I)
C
3 CONTINUE
C
C      Izracunavanje izvoda na kraju intervala:
C
X=X+H
C
CALL SISTEM(X,XE,Y2,F2,ELEC,DELN,DELFR)
C
C      Konacna vrednost promenljiva na kraju intervala iznosi:
C
DO 4 I=1,N
C
      YIZL(I)=YR(I)+H6*(FR(I)+FZ(I)+2.*F3(I))
C
4 CONTINUE
C
C      Povratak u glavni program:
C
C
RETURN
END
*****
```

```

C      SUBROUTINE SISTEM(X,XE,YR,FR,ELEC,DELN,DELF)
C
C      DIMENSION YR(20),FR(20)
C
C      COMMON /S1/ ZCO2,ZN2,ZHE,ZCO,TEMP
C
C      COMMON /S2/ R,FT,VCEV,SCEV
C
C      COMMON /S3/ FPOP,DCEV
C
C      COMMON /S4/ T1,T2,T3,T4,T5
C
C      COMMON /S5/ X1,X2,X3,X4,X5
C
C      COMMON /S6/ A,B,S,C
C
C      DOUBLE PRECISION FR,YR,E1,E2,E3,E4,E5
C
C      DOUBLE PRECISION T6,T2,T5,ZRAK
C
C      REAL X1,X2,X3,X4,X5,TEMP,ELEC
C
C      Inicijalizacija internih promenljivih:
C
C      ZRAK =YR(1)
C
C      E1    =YR(2)
C
C      E2    =YR(3)
C
C      E3    =YR(4)
C
C      E4    =YR(5)
C
C      E5    =YR(6)
C
C      TEMP =YR(7)
C
C      Poziv potprograma za izracunavanje elektronskih gustina:
C
C      CALL GUST(X,XE,ELEC)
C
C      Izracunavanje odgovarajucih vibracionih temperatura:
C
C      T1=1998.4 ALOG((ZCO2*27.6E-14/E1)+1.)
C
C      T2=960.3 ALOG((2*ZCO2*13.26E-14/E2)+1.)
C
C      T3=3382./ALOG((ZCO2*46.7E-14/E3)+1.)
C
C      T4=3354.64 ALOG((ZN2*46.31E-14/E4)+1.)
C
C      T5=3095.5 ALOG((ZCO*42.73E-14/E5)+1.)

```

A=3382./T3
B=960./T2
S=1988./T1
C=3355./T4

C-----
C Izracunavanje odgovarajucih energija:
C-----
C E1T=27.6E-14*ZCO2/(EXP(-1998.4/TEMP)-1.)
C E1T2=26.5E-14*ZCO2/(EXP(2.*B)-1.)
C E2T=2.*13.26E-14*ZCO2/(EXP(960.3/TEMP)-1.)
C E4T3=46.31E-14*ZN2/(EXP(3354.64/T3)-1.)
C E3TT1T2=46.7E-14*ZCO2/EXP(1./(S+B+423.3/TEMP))
C E5TT1T2=42.73E-14*ZCO/(EXP(1./(S+B+136.8/TEMP)))
C E5TT3=42.73E-14*ZCO/(EXP(A-287./TEMP)-1.)
C E5TT4=42.73E-14*ZCO/(EXP(C-259.1/TEMP)-1.)
C-----
C Izracunavanje inverzne nasebljenosti:
C-----
C Z=(1.-EXP(-S))*(1.-EXP(-B))**2.* (1.-EXP(-A))
C ZN001=ZCO2*EXP(-A)**2
C ZN100=ZCO2*EXP(-S)**2
C PJ=(47.232/TEMP)*EXP(-241.92/TEMP)
C PJ1=(49.536/TEMP)*EXP(-266.112/TEMP)
C DELN=ZN001*PJ-0.953*ZN100*PJ1
C-----
C Izracunavanje velicina vezanih za zracenje:
C-----
C TSP=-(2.*DCEV*FPOP)/(3.E10*ALOG(R))
C DELFR=(1.28*ZCO2+1.28*(ZN2+ZCO)+.89*ZHE)*SQRT(TEMP)*1.E-11
C-----
C Pozivanje potprograma za izracunavanje vremena relaksacija:
C-----
C CALL RATES(T20,T10,T43,T12,T3012,T63,T64,T642)
C-----
C A1=E1T
C A2=E1T2
C A3=E2T
C A4=E4T3

C A5=E3*T1*T2
C A6=E5*T1*T2
C A7=E5*T3
C A8=E5*T4
C B1=T10
C B2=T12
C B3=T20
C B4=T30*I2
C B5=T6*I2
C B6=T43
C B7=T63
C B8=T64

C Formiranje sistema diferencijalnih jednacina:

C FR(1)=-ZRAK/TSP+5.73E-3*(3.8E7*DELN*ZRAK/DELFR+9.6E-8*ZN001*P1)
C FR(2)=ELEC*ZCO2*2.75E-13*X1-(E1-A1)/B1-(E1-A2)/B2+.59*(E3-A5)/B4+
642(E5-A6)/B5+9.93E-6*DELN*ZRAK*FPOP/DELFR
C FR(3)=ELEC*ZCO2*1.325E-13*X2+(E1-A2)/B2-(E2-A3)/B3+.284*(E3-A5)/
B4+.31(E5-A6)/B5
C FR(4)=ELEC*ZCO2*4.67E-13*X3-(E3-A5)/B4+(E4-A4)/B6+1.093*(E5-A7)/
*B7-1.67E-5*DELN*ZRAK*FPOP/DELFR
C FR(5)=ELEC*ZN2*4.63E-13*X4-(E4-A4)/B6+1.084*(E5-A8)/B8
C FR(6)=ELEC*ZCO*4.27E-13*X5-(E5-A7)/B7-(E5-A6)/B5-(E5-A8)/B8
C FR(7)=((E1-A1)/B1+(E3-A3)/B3+.128*(E3-A5)/B4+.084*(E5-A8)/B8+
.048(E5-A6)/B5-.093*(E5-A7)/B7)/((.5*(ZCO2+ZCO+ZN2)+1.5*ZHE)*
*1.38E-16)

C Smestanje rezultata u globalne promenljive:
C YR(1)=ZRAK
C YR(2)=EJ
C YR(3)=EZ
C YR(4)=EB
C YR(5)=E4
C YR(6)=E5
C YR(7)=TEMP
C Povratak u glavni program:
C
RETURN
END

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

```

C SUBROUTINE RATES(T20,T10,T43,T12,T3012,T63,T64,T612)
C
C COMMON /S1/ ZCO2,ZN2,ZHE,ZCO,TEMP
C
C COMMON /S4/ T1,T2,T3,T4,T5
C
C COMMON /S6/ A,B,S,C
C
C DOUBLE PRECISION T612,SUM2,T12
C
C Q3=TEMP** (1./3.)
C
C Q6=TEMP** (2./3.)
C
C Izracunavanje vremena relaksacije:
C
C T20=1./((4.6*ZCO2+0.96*ZN2+682.*ZCO)**1.E-10*EXP(-77./Q3) +
C *ZHE*8.1E-11*EXP(-45./Q3))
C
C T10=4.5*T20
C
C T43=1./((ZCO2**1.71E-6*EXP(-175./3/Q3)))
C
C SUM2=2.*1.E-16*(T2**1.5)*(86.5*ZCO2+3.68*ZN2+423*ZHE+3.68*ZCO)
C T12=1./SUM2
C
C FT=EXP(-4223./TEMP-672.7/Q3+2683./Q6)
C
C SUM3=1.E23*FT*(TEMP**(-5.89))*(9.6*ZCO2+6.87*ZN2+2.43*ZHE+
C *6.87*ZCO)*EXP(-423.3/TEMP)
C
C T3012=(EXP(B)-1.)^(EXP(S)-1.)*(EXP(S+B+423.3/TEMP)-1.)/SUM3
C
C T63=(EXP(A)-1.)/(ZCO2**1.56E-11*EXP(-30.1/Q3)*EXP(286.5/TEMP) *
C *(EXP(A-286.5/TEMP)-1.))
C
C T64=(EXP(C)-1.)/(ZN2**6.98E-13*EXP(25.6/Q3)*EXP(259.1/TEMP)*
C *(EXP(C-259.1/TEMP)-1.))
C
C T612=(EXP(S)-1.)*(EXP(B)-1.)/(ZCO**5.96E-22*(TEMP**(-5.86))**FT*
C *(EXP(S+B+136.8/TEMP)-1.))
C
C Povratak u potprogram SISTEM:
C
C RETURN
C END
C*****
```

```

C U modelu eletroionizacionog lasera funkcija el. koncentracije glasi:
C
C      SUBROUTINE GUST(X,XE,ELEC)
C
C      Ukoliko je okoncan elektronski impuls, elek. gustina iznosi:
C
C      IF (X.GE.XE) THEN
C
C          ELEC=ELEC1/(.28E-6*ELEC1*(X-XE)+1.)
C
C      ELSE
C
C          Ukoliko elektronski impuls jos traje, elek. gustina iznosi:
C
C          ELEC=7.E12*TANH(1.96E6*X)
C
C          ELEC1=ELEC
C
C      ENDIF
C
C      Povratak u potprogram SISTEM:
C
C      RETURN
C      END
C**********

```

```

C U modelu lasera sa samost. praznjnjem funkcija el. koncentracije je:
C
C      SUBROUTINE GUST(X,ELEC)
C
C      ELEC=6.E13*(1-EXP(-1.E6*X))*EXP(-2.E6*X)
C
C      Povratak u potprogram SISTEM:
C
C      RETURN
C      END
C**********

```

```

FUNCTION HAMING(N,Y,F,X,H,TE)
C
C      INTEGER HAMING
C
C      LOGICAL PRED
C
C      DIMENSION YPRED(20),TE(20),Y(4,20),F(3,N)
C
C      DOUBLE PRECISION Y,F,YPRED,TE
C
C      DATA PRED / .TRUE. /
C
C      Izbor prediktorskog ili korektorskog dela potprograma:
C
C      IF(.NOT.PRED) GO TO 4
C
C      Prediktorski deo:
C      Izracunavanje prediktorskih Y(J) vrednosti u sledecoj tacki:
C
C      DO 1 J=1,N
C      YPRED(J)=Y(4,J)+4.*H*(2.*F(1,J)-F(2,J)+2.*F(3,J))/3.
C      CONTINUE
C
C      Punjenje Y i F matrice novoizracunatim vrednostima:
C
C      DO 2 J=1,N
C      DO 20 K5=1,3
C      K=5-K5
C      Y(K,J)=Y(K-1,J)
C      IF(K.LT.4) F(K,J)=F(K-1,J)
C      CONTINUE
C      CONTINUE
C
C      Modifikacija prediktorskih Y(J) vrednosti koriscenjem greske izracunate u prethodnom koraku i povecanje X vrednosti:
C
C      DO 3 J=1,N
C      Y(1,J)=YPRED(J)+112.*TE(J)/9.
C      CONTINUE
C      X=X+H
C
C      Povratak u glavni program:
C
C      PRED=.FALSE.
C      HAMING=1
C      RETURN
C
C      Korektorski deo:
C
C      DO 4 J=1,N
C      Y(1,J)=(9.*Y(2,J)-Y(4,J)+3.*H*(F(1,J)+2.*F(2,J)-F(3,J)))/8.
C      TE(J)=9.*(Y(1,J)-YPRED(J))/121.
C      Y(1,J)=Y(1,J)-TE(J)
C      CONTINUE
C
C      Povratak u glavni program:
C
C      PRED=.TRUE.
C
C      HAMING=2
C
C      RETURN
END

```

```

SUBROUTINE PROVERA(H,ELEC,YR,EKIN,EVIB,EELEK,EIZL,PIZL)
C
COMMON /S1/ ZCO2,ZN2,ZHE,ZCO,TEMP
C
COMMON /S2/ R,PF,VCEV,SCEV
C
COMMON /S3/ FPOP,DCEV
C
COMMON /S5/ X1,X2,X3,X4,X5
C
DIMENSION YR(20)
C
DOUBLE PRECISION YR
C
C Izracunavanje integralnog toka elektrona:
C
ELINT=ELINT+H*(ELEC+PELEC)/Z.
C
PELEC=ELEC
C
C Izracunavanje ukupne izracene energije:
C
EZRAK=EZRAK+(YR(1)+POMOC1)*H/2.
C
POMOC1=YR(1)
C
C Izracunavanje snage zracenja:
C
PIZL=-(SCEV*YR(1)*ALOG(R)/2)*1.E-7
C
C Izracunavanje kineticke energije:
C
EKIN=(2.5*(ZCO2+ZN2)+1.5*(ZHE+ZCO))*1.38E-23*YR(7)
C
C Izracunavanje vibracione energije:
C
EVIB=(YR(2)+YR(3)+YR(4)+YR(5)+YR(6))*1.E-7
C
C Izracunavanje elektronske energije:
C
EELEK=((2.76*X1+1.33*X2+4.67*X3)*ZCO2+4.63*4*ZN2+4.27*X5*ZCO)*
*1.E-20*ELINT
C
C Izracunavanje izracene energije:
C
EIZL=EZRAK*ALOG(R)/(Z.*DCEV)*1.E-7
C
C Povratak u glavni program:
C
RETURN
END
*****
```

PRILOG A:

"LISTING" REZULTATA PRORAČUNA

ELEKTROJONI ZACI ONOG LASERA

VREME	T1	T2	T3	T4	T5	T
(1.E-6)	(K)	(K)	(K)	(K)	(K)	(K)
.00	300.00	300.00	300.00	300.00	300.00	300.00
.01	309.46	299.28	306.26	308.21	312.70	300.00
.02	309.54	299.29	320.20	325.23	334.14	300.00
.03	309.57	299.32	335.84	343.35	354.91	300.00
.04	309.60	299.35	350.97	360.39	373.94	300.00
.05	309.64	299.38	365.11	376.10	391.41	300.00
.06	309.68	299.43	378.27	390.62	407.65	300.00
.07	309.73	299.48	390.57	404.15	422.87	300.00
.08	309.79	299.53	402.12	416.85	437.28	300.00
.09	309.85	299.59	413.04	428.85	451.01	300.00
.10	309.92	299.66	423.43	440.27	464.17	300.00
.11	310.00	299.73	433.34	451.18	476.84	300.00
.12	310.08	299.81	442.85	461.65	489.09	300.00
.13	310.16	299.90	452.00	471.74	500.98	300.00
.14	310.25	299.98	460.83	481.50	512.55	300.00
.15	310.35	300.08	469.37	490.95	523.83	300.00
.16	310.45	300.18	477.66	500.14	534.86	300.00
.17	310.56	300.28	485.71	509.08	545.65	300.00
.18	310.67	300.39	493.56	517.80	556.24	300.00
.19	310.78	300.50	501.20	526.31	566.64	300.00
.20	310.90	300.62	508.67	534.64	576.87	300.00
.21	311.02	300.73	515.79	542.59	586.56	300.00
.22	311.14	300.85	522.44	550.02	595.60	300.00
.23	311.26	300.96	528.69	557.01	604.13	300.00
.24	311.48	301.07	534.39	563.62	612.24	300.00
.25	312.94	301.72	526.08	569.89	619.93	300.00
.26	313.04	302.06	526.34	575.86	627.30	300.00
.27	313.34	302.38	526.90	581.56	634.38	300.00
.28	313.65	302.68	527.42	587.02	641.19	300.00
.29	313.95	302.98	527.92	592.25	647.75	300.00
.30	314.25	303.27	528.41	597.29	654.09	300.00
.31	314.53	303.56	528.88	602.14	660.23	300.00
.32	314.81	303.84	529.35	606.83	666.17	300.00
.33	315.09	304.11	529.80	611.36	671.93	300.00
.34	315.36	304.38	530.24	615.74	677.53	300.00
.35	315.62	304.64	530.68	619.99	682.98	300.00
.36	315.88	304.90	531.10	624.12	688.28	300.00
.37	316.13	305.15	531.52	628.12	693.45	300.00
.38	316.38	305.39	531.92	632.02	698.49	300.00
.39	316.62	305.63	532.32	635.81	703.41	300.00
.40	316.85	305.86	532.71	639.51	708.21	300.00
.41	317.08	306.09	533.09	643.11	712.91	300.00
.42	317.31	306.31	533.46	646.63	717.51	300.00
.43	317.52	306.53	533.82	650.07	722.01	300.00
.44	317.74	306.74	534.18	653.42	726.42	300.00
.45	317.95	306.95	534.52	656.70	730.74	300.00
.46	318.15	307.16	534.86	659.91	734.98	300.00
.47	318.35	307.36	535.19	663.06	739.13	300.00
.48	318.55	307.55	535.51	666.14	743.21	300.00
.49	318.74	307.74	535.83	669.15	747.22	300.00
.50	318.93	307.93	536.14	672.11	751.16	300.00

VREME (1.E-6)	T1 (K)	T2 (K)	T3 (K)	T4 (K)	T5 (K)	T (K)
.51	319.11	308.11	536.44	675.01	755.03	300.00
.52	319.29	308.28	536.73	677.86	758.83	300.00
.53	319.46	308.46	537.02	680.65	762.57	300.00
.54	319.63	308.63	537.30	683.39	766.26	300.00
.55	319.80	308.79	537.58	686.09	769.88	300.00
.56	319.96	308.95	537.85	688.74	773.45	300.00
.57	320.12	309.11	538.11	691.35	776.96	300.00
.58	320.28	309.27	538.36	693.91	780.43	300.00
.59	320.43	309.42	538.61	696.43	783.84	300.00
.60	320.58	309.56	538.86	698.91	787.20	300.00
.61	320.72	309.71	539.10	701.35	790.52	300.00
.62	320.86	309.85	539.33	703.75	793.79	300.00
.63	321.00	309.98	539.55	706.12	797.01	300.00
.64	321.13	310.12	539.78	708.45	800.20	300.00
.65	321.26	310.25	539.99	710.75	803.34	300.00
.66	321.39	310.37	540.20	713.01	806.44	300.00
.67	321.51	310.50	540.41	715.24	809.50	300.01
.68	321.64	310.62	540.61	717.45	812.51	300.04
.69	321.75	310.74	540.81	719.62	815.48	300.07
.70	321.87	310.85	541.00	721.76	818.41	300.10
.71	321.98	310.96	541.19	723.87	821.31	300.13
.72	322.10	311.07	541.37	725.96	824.17	300.16
.73	322.20	311.18	541.55	728.02	827.00	300.19
.74	322.31	311.29	541.73	730.05	829.79	300.22
.75	322.41	311.39	541.90	732.05	832.55	300.25
.76	322.52	311.49	542.07	734.04	835.29	300.29
.77	322.62	311.59	542.23	735.99	837.99	300.32
.78	322.71	311.69	542.40	737.93	840.66	300.35
.79	322.81	311.78	542.55	739.84	843.30	300.38
.80	322.90	311.88	542.71	741.72	845.92	300.41
.81	322.99	311.97	542.86	743.59	848.50	300.44
.82	323.08	312.06	543.00	745.43	851.06	300.47
.83	323.17	312.14	543.15	747.26	853.60	300.50
.84	323.25	312.23	543.29	749.06	856.10	300.53
.85	323.33	312.31	543.43	750.84	858.59	300.56
.86	323.41	312.39	543.56	752.61	861.04	300.59
.87	323.49	312.47	543.69	754.35	863.48	300.62
.88	323.57	312.55	543.82	756.08	865.89	300.65
.89	323.65	312.62	543.94	757.78	868.27	300.68
.90	323.72	312.69	544.06	759.47	870.63	300.71
.91	323.79	312.77	544.18	761.14	872.98	300.74
.92	323.86	312.84	544.30	762.80	875.30	300.77
.93	323.93	312.90	544.41	764.44	877.59	300.80
.94	324.00	312.97	544.53	766.06	879.87	300.83
.95	324.06	313.04	544.63	767.66	882.13	300.86
.96	324.12	313.10	544.74	769.25	884.36	300.90
.97	324.19	313.16	544.84	770.83	886.58	300.93
.98	324.25	313.22	544.94	772.39	888.77	300.96
.99	324.31	313.28	545.04	773.93	890.95	300.99
1.00	324.36	313.34	545.14	775.46	893.11	301.02

VREME (1.E-6)	T1 (K)	T2 (K)	T3 (K)	T4 (K)	T5 (K)	T (K)
1.01	324.42	313.40	545.23	776.97	895.25	301.05
1.02	324.47	313.45	545.32	778.48	897.37	301.08
1.03	324.53	313.51	545.41	779.96	899.48	301.11
1.04	324.58	313.56	545.50	781.44	901.56	301.14
1.05	324.63	313.61	545.58	782.90	903.63	301.17
1.06	324.68	313.66	545.67	784.34	905.68	301.20
1.07	324.73	313.71	545.75	785.78	907.72	301.23
1.08	324.78	313.75	545.82	787.20	909.74	301.26
1.09	324.82	313.80	545.90	788.61	911.74	301.29
1.10	324.87	313.85	545.98	790.01	913.73	301.32
1.11	324.91	313.89	546.05	791.39	915.70	301.35
1.12	324.95	313.93	546.12	792.77	917.66	301.38
1.13	324.99	313.97	546.19	794.13	919.60	301.41
1.14	325.03	314.01	546.25	795.48	921.53	301.44
1.15	325.07	314.05	546.32	796.82	923.44	301.48
1.16	325.11	314.09	546.38	798.15	925.34	301.51
1.17	325.15	314.13	546.45	799.47	927.22	301.54
1.18	325.18	314.17	546.51	800.77	929.09	301.57
1.19	325.22	314.20	546.56	802.07	930.95	301.60
1.20	325.25	314.24	546.62	803.36	932.79	301.63
1.21	325.29	314.27	546.68	804.63	934.62	301.66
1.22	325.32	314.30	546.73	805.90	936.44	301.69
1.23	325.35	314.34	546.78	807.15	938.24	301.72
1.24	325.38	314.37	546.83	808.40	940.03	301.75
1.25	325.41	314.40	546.88	809.64	941.81	301.78
1.26	325.44	314.43	546.93	810.87	943.57	301.81
1.27	325.47	314.45	546.98	812.09	945.33	301.84
1.28	325.49	314.48	547.02	813.30	947.07	301.87
1.29	325.52	314.51	547.07	814.50	948.80	301.90
1.30	325.55	314.53	547.11	815.69	950.52	301.93
1.31	325.57	314.56	547.15	816.87	952.22	301.96
1.32	325.59	314.58	547.19	818.05	953.92	301.99
1.33	325.62	314.61	547.23	819.21	955.60	302.02
1.34	325.64	314.63	547.27	820.37	957.27	302.06
1.35	325.66	314.65	547.31	821.52	958.94	302.09
1.36	325.68	314.68	547.34	822.66	960.59	302.12
1.37	325.70	314.70	547.38	823.79	962.23	302.15
1.38	325.72	314.72	547.41	824.92	963.86	302.18
1.39	325.74	314.74	547.44	826.04	965.48	302.21
1.40	325.76	314.76	547.48	827.15	967.08	302.24
1.41	325.78	314.78	547.51	828.25	968.68	302.27
1.42	325.80	314.79	547.53	829.35	970.27	302.30
1.43	325.81	314.81	547.56	830.43	971.85	302.33
1.44	325.83	314.83	547.59	831.51	973.42	302.36
1.45	325.85	314.84	547.62	832.59	974.98	302.39
1.46	325.86	314.86	547.64	833.65	976.53	302.42
1.47	325.87	314.88	547.67	834.71	978.07	302.45
1.48	325.89	314.89	547.69	835.77	979.60	302.48
1.49	325.90	314.90	547.72	836.81	981.12	302.51
1.50	325.92	314.92	547.74	837.85	982.64	302.54

VREME	T1	T2	T3	T4	T5	T
(1.E-6)	(K)	(K)	(K)	(K)	(K)	(K)
1.51	325.93	314.93	547.76	838.88	984.14	302.57
1.52	325.94	314.94	547.78	839.91	985.64	302.60
1.53	325.95	314.96	547.80	840.93	987.12	302.63
1.54	325.96	314.97	547.82	841.94	988.60	302.67
1.55	325.97	314.98	547.84	842.95	990.07	302.70
1.56	325.98	314.99	547.85	843.95	991.53	302.73
1.57	325.99	315.00	547.87	844.94	992.99	302.76
1.58	326.00	315.01	547.89	845.93	994.43	302.79
1.59	326.01	315.02	547.90	846.91	995.87	302.82
1.60	326.02	315.03	547.92	847.89	997.29	302.85
1.61	326.03	315.04	547.93	848.86	998.71	302.88
1.62	326.04	315.05	547.95	849.82	1000.13	302.91
1.63	326.04	315.06	547.96	850.78	1001.53	302.94
1.64	326.05	315.06	547.97	851.73	1002.93	302.97
1.65	326.06	315.07	547.99	852.68	1004.32	303.00
1.66	326.07	315.08	548.00	853.62	1005.70	303.03
1.67	326.07	315.09	548.01	854.56	1007.07	303.06
1.68	326.08	315.09	548.02	855.49	1008.44	303.09
1.69	326.08	315.10	548.03	856.41	1009.80	303.12
1.70	326.09	315.11	548.04	857.33	1011.15	303.15
1.71	326.09	315.11	548.05	858.25	1012.49	303.18
1.72	326.10	315.12	548.05	859.16	1013.83	303.21
1.73	326.10	315.12	548.06	860.06	1015.16	303.25
1.74	326.11	315.13	548.07	860.96	1016.49	303.28
1.75	326.11	315.13	548.08	861.86	1017.80	303.31
1.76	326.11	315.14	548.08	862.75	1019.11	303.34
1.77	326.12	315.14	548.09	863.63	1020.42	303.37
1.78	326.12	315.14	548.10	864.51	1021.71	303.40
1.79	326.12	315.15	548.10	865.39	1023.00	303.43
1.80	326.13	315.15	548.11	866.26	1024.29	303.46
1.81	326.13	315.15	548.11	867.12	1025.56	303.49
1.82	326.13	315.16	548.12	867.98	1026.84	303.52
1.83	326.13	315.16	548.12	868.84	1028.10	303.55
1.84	326.13	315.16	548.12	869.69	1029.36	303.58
1.85	326.14	315.17	548.13	870.54	1030.61	303.61
1.86	326.14	315.17	548.13	871.38	1031.86	303.64
1.87	326.14	315.17	548.13	872.22	1033.09	303.67
1.88	326.14	315.17	548.14	873.06	1034.33	303.70
1.89	326.14	315.17	548.14	873.88	1035.56	303.73
1.90	326.14	315.17	548.14	874.71	1036.78	303.76
1.91	326.14	315.18	548.14	875.53	1037.99	303.79
1.92	326.14	315.18	548.14	876.35	1039.20	303.83
1.93	326.14	315.18	548.14	877.16	1040.41	303.86
1.94	326.14	315.18	548.14	877.97	1041.60	303.89
1.95	326.14	315.18	548.15	878.78	1042.80	303.92
1.96	326.14	315.18	548.15	879.58	1043.98	303.95
1.97	326.14	315.18	548.15	880.37	1045.17	303.98
1.98	326.14	315.18	548.15	881.17	1046.34	304.01
1.99	326.14	315.18	548.15	881.95	1047.51	304.04
2.00	326.14	315.18	548.15	882.74	1048.68	304.07

VREME	T1	T2	T3	T4	T5	T
(1.E-6)	(K)	(K)	(K)	(K)	(K)	(K)
2.01	326.14	315.18	548.15	883.52	1049.84	304.10
2.02	326.14	315.18	548.14	884.30	1050.99	304.13
2.03	326.14	315.18	548.14	885.07	1052.14	304.16
2.04	326.14	315.18	548.14	885.84	1053.28	304.19
2.05	326.14	315.18	548.14	886.61	1054.42	304.22
2.06	326.13	315.18	548.14	887.37	1055.56	304.25
2.07	326.13	315.18	548.14	888.13	1056.68	304.28
2.08	326.13	315.18	548.14	888.88	1057.81	304.31
2.09	326.13	315.18	548.14	889.63	1058.93	304.34
2.10	326.13	315.18	548.13	890.38	1060.04	304.37
2.11	326.13	315.18	548.13	891.13	1061.15	304.40
2.12	326.13	315.18	548.13	891.87	1062.25	304.44
2.13	326.12	315.18	548.13	892.61	1063.35	304.47
2.14	326.12	315.17	548.13	893.34	1064.44	304.50
2.15	326.12	315.17	548.12	894.07	1065.53	304.53
2.16	326.12	315.17	548.12	894.80	1066.62	304.56
2.17	326.12	315.17	548.12	895.52	1067.70	304.59
2.18	326.11	315.17	548.12	896.24	1068.77	304.62
2.19	326.11	315.17	548.11	896.96	1069.84	304.65
2.20	326.11	315.17	548.11	897.68	1070.91	304.68
2.21	326.11	315.17	548.11	898.39	1071.97	304.71
2.22	326.11	315.17	548.11	899.10	1073.03	304.74
2.23	326.10	315.16	548.10	899.80	1074.08	304.77
2.24	326.10	315.16	548.10	900.50	1075.13	304.80
2.25	326.10	315.16	548.10	901.20	1076.17	304.83
2.26	326.10	315.16	548.09	901.90	1077.21	304.86
2.27	326.10	315.16	548.09	902.59	1078.25	304.89
2.28	326.09	315.16	548.09	903.28	1079.28	304.92
2.29	326.09	315.15	548.09	903.96	1080.30	304.95
2.30	326.09	315.15	548.08	904.65	1081.33	304.98
2.31	326.09	315.15	548.08	905.33	1082.34	305.02
2.32	326.08	315.15	548.08	906.01	1083.36	305.05
2.33	326.08	315.15	548.07	906.68	1084.37	305.08
2.34	326.08	315.15	548.07	907.35	1085.37	305.11
2.35	326.08	315.15	548.07	908.02	1086.38	305.14
2.36	326.08	315.14	548.06	908.69	1087.37	305.17
2.37	326.07	315.14	548.06	909.35	1088.37	305.20
2.38	326.07	315.14	548.06	910.01	1089.36	305.23
2.39	326.07	315.14	548.06	910.67	1090.34	305.26
2.40	326.07	315.14	548.05	911.33	1091.32	305.29
2.41	326.06	315.14	548.05	911.98	1092.30	305.32
2.42	326.06	315.14	548.05	912.63	1093.28	305.35
2.43	326.06	315.13	548.04	913.28	1094.25	305.38
2.44	326.06	315.13	548.04	913.92	1095.21	305.41
2.45	326.06	315.13	548.04	914.56	1096.18	305.44
2.46	326.05	315.13	548.04	915.20	1097.14	305.47
2.47	326.05	315.13	548.03	915.84	1098.09	305.50
2.48	326.05	315.13	548.03	916.47	1099.05	305.52
2.49	326.05	315.13	548.03	917.10	1100.02	305.52
2.50	326.05	315.12	548.02	917.73	1101.00	305.52

VREME	T1	T2	T3	T4	T5	T
(1.E-6)	(K)	(K)	(K)	(K)	(K)	(K)
2.51	326.04	315.12	548.02	918.36	1101.97	305.52
2.52	326.04	315.12	548.01	918.98	1102.94	305.52
2.53	326.04	315.12	548.01	919.61	1103.91	305.52
2.54	326.03	315.11	548.00	920.22	1104.87	305.52
2.55	326.03	315.11	548.00	920.84	1105.84	305.52
2.56	326.02	315.11	547.99	921.46	1106.79	305.52
2.57	326.02	315.10	547.98	922.07	1107.75	305.52
2.58	326.01	315.10	547.97	922.68	1108.70	305.52
2.59	326.01	315.09	547.96	923.28	1109.64	305.52
2.60	326.00	315.09	547.96	923.89	1110.59	305.52
2.61	326.00	315.08	547.95	924.49	1111.53	305.52
2.62	325.99	315.08	547.94	925.09	1112.47	305.52
2.63	325.99	315.07	547.93	925.69	1113.40	305.52
2.64	325.98	315.07	547.92	926.28	1114.33	305.52
2.65	325.97	315.06	547.90	926.88	1115.26	305.52
2.66	325.97	315.05	547.89	927.47	1116.19	305.52
2.67	325.96	315.05	547.88	928.06	1117.11	305.52
2.68	325.95	315.04	547.87	928.64	1118.03	305.52
2.69	325.94	315.03	547.86	929.23	1118.94	305.52
2.70	325.94	315.03	547.84	929.81	1119.86	305.52
2.71	325.93	315.02	547.83	930.39	1120.77	305.52
2.72	325.92	315.01	547.82	930.97	1121.67	305.52
2.73	325.91	315.00	547.80	931.55	1122.58	305.52
2.74	325.90	315.00	547.79	932.12	1123.48	305.52
2.75	325.89	314.99	547.78	932.69	1124.37	305.52
2.76	325.89	314.98	547.76	933.26	1125.27	305.52
2.77	325.88	314.97	547.74	933.83	1126.16	305.52
2.78	325.87	314.96	547.73	934.39	1127.05	305.52
2.79	325.86	314.95	547.71	934.96	1127.94	305.52
2.80	325.85	314.95	547.70	935.52	1128.82	305.52
2.81	325.84	314.94	547.68	936.08	1129.70	305.52
2.82	325.83	314.93	547.66	936.64	1130.58	305.52
2.83	325.82	314.92	547.65	937.19	1131.45	305.52
2.84	325.81	314.91	547.63	937.74	1132.32	305.52
2.85	325.80	314.90	547.61	938.30	1133.19	305.52
2.86	325.79	314.89	547.60	938.85	1134.06	305.52
2.87	325.77	314.88	547.58	939.39	1134.92	305.52
2.88	325.76	314.87	547.56	939.94	1135.78	305.52
2.89	325.75	314.86	547.54	940.48	1136.64	305.52
2.90	325.74	314.85	547.52	941.02	1137.50	305.52
2.91	325.73	314.84	547.50	941.56	1138.35	305.52
2.92	325.72	314.82	547.48	942.10	1139.20	305.52
2.93	325.71	314.81	547.47	942.64	1140.05	305.52
2.94	325.70	314.80	547.45	943.17	1140.89	305.52
2.95	325.68	314.79	547.43	943.71	1141.74	305.52
2.96	325.67	314.78	547.41	944.24	1142.58	305.52
2.97	325.66	314.77	547.39	944.76	1143.41	305.52
2.98	325.65	314.76	547.37	945.29	1144.25	305.52
2.99	325.63	314.75	547.35	945.82	1145.08	305.52
3.00	325.62	314.73	547.32	946.34	1145.91	305.52

VREME	T1	T2	T3	T4	T5	T
(1.E-6)	(K)	(K)	(K)	(K)	(K)	(K)
3.01	325.61	314.72	547.30	946.86	1146.74	305.52
3.02	325.60	314.71	547.28	947.38	1147.56	305.52
3.03	325.58	314.70	547.26	947.90	1148.38	305.52
3.04	325.57	314.69	547.24	948.42	1149.20	305.52
3.05	325.56	314.67	547.22	948.93	1150.02	305.52
3.06	325.54	314.66	547.20	949.45	1150.84	305.52
3.07	325.53	314.65	547.17	949.96	1151.65	305.52
3.08	325.52	314.64	547.15	950.47	1152.46	305.52
3.09	325.50	314.62	547.13	950.98	1153.27	305.52
3.10	325.49	314.61	547.11	951.48	1154.07	305.52
3.11	325.48	314.60	547.09	951.99	1154.88	305.52
3.12	325.46	314.58	547.06	952.49	1155.68	305.52
3.13	325.45	314.57	547.04	952.99	1156.47	305.52
3.14	325.44	314.56	547.02	953.49	1157.27	305.52
3.15	325.42	314.55	547.00	953.99	1158.06	305.52
3.16	325.41	314.53	546.97	954.49	1158.86	305.52
3.17	325.39	314.52	546.95	954.98	1159.64	305.52
3.18	325.38	314.51	546.93	955.47	1160.43	305.52
3.19	325.37	314.49	546.90	955.97	1161.22	305.52
3.20	325.35	314.48	546.88	956.46	1162.00	305.52
3.21	325.34	314.46	546.86	956.95	1162.78	305.52
3.22	325.32	314.45	546.83	957.43	1163.56	305.52
3.23	325.31	314.44	546.81	957.92	1164.33	305.52
3.24	325.29	314.42	546.78	958.40	1165.11	305.52
3.25	325.28	314.41	546.76	958.89	1165.88	305.52
3.26	325.27	314.40	546.74	959.37	1166.65	305.52
3.27	325.25	314.38	546.71	959.85	1167.41	305.52
3.28	325.24	314.37	546.69	960.33	1168.18	305.52
3.29	325.22	314.35	546.66	960.80	1168.94	305.52
3.30	325.21	314.34	546.64	961.28	1169.70	305.52
3.31	325.19	314.33	546.61	961.75	1170.46	305.52
3.32	325.18	314.31	546.59	962.22	1171.22	305.52
3.33	325.16	314.30	546.56	962.69	1171.97	305.52
3.34	325.15	314.28	546.54	963.16	1172.73	305.52
3.35	325.13	314.27	546.52	963.63	1173.48	305.52
3.36	325.12	314.26	546.49	964.10	1174.22	305.52
3.37	325.10	314.24	546.47	964.56	1174.97	305.52
3.38	325.09	314.23	546.44	965.03	1175.71	305.52
3.39	325.07	314.21	546.42	965.49	1176.46	305.52
3.40	325.06	314.20	546.39	965.95	1177.20	305.52
3.41	325.04	314.18	546.37	966.41	1177.94	305.52
3.42	325.03	314.17	546.34	966.87	1178.67	305.52
3.43	325.01	314.15	546.32	967.33	1179.41	305.52
3.44	325.00	314.14	546.29	967.78	1180.14	305.52
3.45	324.98	314.13	546.27	968.24	1180.87	305.52
3.46	324.97	314.11	546.24	968.69	1181.60	305.52
3.47	324.95	314.10	546.21	969.14	1182.32	305.52
3.48	324.93	314.08	546.19	969.59	1183.05	305.52
3.49	324.92	314.07	546.16	970.04	1183.77	305.52
3.50	324.90	314.05	546.14	970.49	1184.49	305.52

VREME (1.E-6)	T1 (K)	T2 (K)	T3 (K)	T4 (K)	T5 (K)	T (K)
3.51	324.89	314.04	546.11	970.93	1185.21	305.52
3.52	324.87	314.02	546.09	971.38	1185.93	305.52
3.53	324.86	314.01	546.06	971.82	1186.64	305.52
3.54	324.84	313.99	546.04	972.26	1187.36	305.52
3.55	324.83	313.98	546.01	972.70	1188.07	305.52
3.56	324.81	313.96	545.99	973.14	1188.78	305.52
3.57	324.80	313.95	545.96	973.58	1189.49	305.52
3.58	324.78	313.93	545.93	974.02	1190.19	305.52
3.59	324.76	313.92	545.91	974.46	1190.90	305.52
3.60	324.75	313.91	545.88	974.89	1191.60	305.52
3.61	324.73	313.89	545.86	975.33	1192.30	305.52
3.62	324.72	313.88	545.83	975.76	1193.00	305.52
3.63	324.70	313.86	545.81	976.19	1193.70	305.52
3.64	324.69	313.85	545.78	976.62	1194.39	305.52
3.65	324.67	313.83	545.76	977.05	1195.08	305.52
3.66	324.66	313.82	545.73	977.48	1195.78	305.52
3.67	324.64	313.80	545.70	977.90	1196.47	305.52
3.68	324.62	313.79	545.68	978.33	1197.16	305.52
3.69	324.61	313.77	545.65	978.75	1197.84	305.52
3.70	324.59	313.76	545.63	979.17	1198.53	305.52
3.71	324.58	313.74	545.60	979.59	1199.21	305.52
3.72	324.56	313.73	545.58	980.02	1199.89	305.52
3.73	324.55	313.71	545.55	980.43	1200.57	305.52
3.74	324.53	313.70	545.52	980.85	1201.25	305.52
3.75	324.52	313.68	545.50	981.27	1201.93	305.52
3.76	324.50	313.67	545.47	981.69	1202.60	305.52
3.77	324.49	313.65	545.45	982.10	1203.27	305.52
3.78	324.47	313.64	545.42	982.51	1203.95	305.52
3.79	324.45	313.62	545.40	982.93	1204.62	305.52
3.80	324.44	313.61	545.37	983.34	1205.28	305.52
3.81	324.42	313.59	545.35	983.75	1205.95	305.52
3.82	324.41	313.58	545.32	984.16	1206.62	305.52
3.83	324.39	313.57	545.29	984.57	1207.28	305.52
3.84	324.38	313.55	545.27	984.97	1207.94	305.52
3.85	324.36	313.54	545.24	985.38	1208.60	305.52
3.86	324.35	313.52	545.22	985.78	1209.26	305.52
3.87	324.33	313.51	545.19	986.19	1209.92	305.52
3.88	324.32	313.49	545.17	986.59	1210.57	305.52
3.89	324.30	313.48	545.14	986.99	1211.23	305.52
3.90	324.28	313.46	545.12	987.39	1211.88	305.52
3.91	324.27	313.45	545.09	987.79	1212.53	305.52
3.92	324.25	313.43	545.07	988.19	1213.18	305.52
3.93	324.24	313.42	545.04	988.59	1213.83	305.52
3.94	324.22	313.40	545.02	988.98	1214.48	305.52
3.95	324.21	313.39	544.99	989.38	1215.12	305.52
3.96	324.19	313.37	544.96	989.77	1215.76	305.52
3.97	324.18	313.36	544.94	990.17	1216.41	305.52
3.98	324.16	313.35	544.91	990.56	1217.05	305.52
3.99	324.15	313.33	544.89	990.95	1217.69	305.52
4.00	324.13	313.32	544.86	991.34	1218.32	305.52

VREME	T1	T2	T3	T4	T5	T
(1.E-6)	(K)	(K)	(K)	(K)	(K)	(K)
4.01	324.12	313.30	544.84	991.73	1218.96	305.52
4.02	324.10	313.29	544.81	992.12	1219.59	305.52
4.03	324.09	313.27	544.79	992.50	1220.23	305.52
4.04	324.07	313.26	544.76	992.89	1220.86	305.52
4.05	324.06	313.24	544.74	993.28	1221.49	305.52
4.06	324.04	313.23	544.71	993.66	1222.12	305.52
4.07	324.03	313.22	544.69	994.04	1222.74	305.52
4.08	324.01	313.20	544.66	994.43	1223.37	305.52
4.09	324.00	313.19	544.64	994.81	1223.99	305.52
4.10	323.98	313.17	544.62	995.19	1224.62	305.52
4.11	323.97	313.16	544.59	995.57	1225.24	305.52
4.12	323.95	313.14	544.57	995.95	1225.86	305.52
4.13	323.94	313.13	544.54	996.32	1226.48	305.52
4.14	323.92	313.12	544.52	996.70	1227.10	305.52
4.15	323.91	313.10	544.49	997.08	1227.71	305.52
4.16	323.89	313.09	544.47	997.45	1228.33	305.52
4.17	323.88	313.07	544.44	997.82	1228.94	305.52
4.18	323.86	313.06	544.42	998.20	1229.55	305.52
4.19	323.85	313.05	544.39	998.57	1230.16	305.52
4.20	323.83	313.03	544.37	998.94	1230.77	305.52
4.21	323.82	313.02	544.35	999.31	1231.38	305.52
4.22	323.80	313.00	544.32	999.68	1231.99	305.52
4.23	323.79	312.99	544.30	1000.05	1232.59	305.52
4.24	323.77	312.98	544.27	1000.42	1233.20	305.52
4.25	323.76	312.96	544.25	1000.78	1233.80	305.52
4.26	323.75	312.95	544.23	1001.15	1234.40	305.52
4.27	323.73	312.93	544.20	1001.51	1235.00	305.52
4.28	323.72	312.92	544.18	1001.88	1235.60	305.52
4.29	323.70	312.91	544.15	1002.24	1236.20	305.52
4.30	323.69	312.89	544.13	1002.60	1236.79	305.52
4.31	323.67	312.88	544.11	1002.96	1237.39	305.52
4.32	323.66	312.86	544.08	1003.32	1237.98	305.52
4.33	323.64	312.85	544.06	1003.68	1238.57	305.52
4.34	323.63	312.84	544.04	1004.04	1239.16	305.52
4.35	323.62	312.82	544.01	1004.40	1239.75	305.52
4.36	323.60	312.81	543.99	1004.76	1240.34	305.52
4.37	323.59	312.80	543.96	1005.11	1240.93	305.52
4.38	323.57	312.78	543.94	1005.47	1241.52	305.52
4.39	323.56	312.77	543.92	1005.82	1242.10	305.52
4.40	323.54	312.76	543.89	1006.18	1242.68	305.52
4.41	323.53	312.74	543.87	1006.53	1243.27	305.52
4.42	323.52	312.73	543.85	1006.88	1243.85	305.52
4.43	323.50	312.72	543.82	1007.23	1244.43	305.52
4.44	323.49	312.70	543.80	1007.58	1245.01	305.52
4.45	323.47	312.69	543.78	1007.93	1245.58	305.52
4.46	323.46	312.67	543.76	1008.28	1246.16	305.52
4.47	323.45	312.66	543.73	1008.63	1246.73	305.52
4.48	323.43	312.65	543.71	1008.97	1247.31	305.52
4.49	323.42	312.64	543.69	1009.32	1247.88	305.52
4.50	323.40	312.62	543.66	1009.67	1248.45	305.52

VREME	T1	T2	T3	T4	T5	T
(1.E-6)	(K)	(K)	(K)	(K)	(K)	(K)
4.51	323.39	312.61	543.64	1010.01	1249.02	305.52
4.52	323.38	312.60	543.62	1010.35	1249.59	305.52
4.53	323.36	312.58	543.60	1010.70	1250.16	305.52
4.54	323.35	312.57	543.57	1011.04	1250.73	305.52
4.55	323.34	312.56	543.55	1011.38	1251.29	305.52
4.56	323.32	312.54	543.53	1011.72	1251.86	305.52
4.57	323.31	312.53	543.50	1012.06	1252.42	305.52
4.58	323.30	312.52	543.48	1012.40	1252.98	305.52
4.59	323.28	312.50	543.46	1012.74	1253.54	305.52
4.60	323.27	312.49	543.44	1013.08	1254.10	305.52
4.61	323.25	312.48	543.42	1013.41	1254.66	305.52
4.62	323.24	312.47	543.39	1013.75	1255.22	305.52
4.63	323.23	312.45	543.37	1014.09	1255.78	305.52
4.64	323.21	312.44	543.35	1014.42	1256.33	305.52
4.65	323.20	312.43	543.33	1014.76	1256.88	305.52
4.66	323.19	312.41	543.31	1015.09	1257.44	305.52
4.67	323.17	312.40	543.28	1015.42	1257.99	305.52
4.68	323.16	312.39	543.26	1015.75	1258.54	305.52
4.69	323.15	312.38	543.24	1016.08	1259.09	305.52
4.70	323.14	312.36	543.22	1016.41	1259.64	305.52
4.71	323.12	312.35	543.20	1016.74	1260.19	305.52
4.72	323.11	312.34	543.17	1017.07	1260.73	305.52
4.73	323.10	312.33	543.15	1017.40	1261.28	305.52
4.74	323.08	312.31	543.13	1017.73	1261.82	305.52
4.75	323.07	312.30	543.11	1018.05	1262.37	305.52
4.76	323.06	312.29	543.09	1018.38	1262.91	305.52
4.77	323.04	312.28	543.07	1018.70	1263.45	305.52
4.78	323.03	312.26	543.05	1019.03	1263.99	305.52
4.79	323.02	312.25	543.02	1019.35	1264.53	305.52
4.80	323.01	312.24	543.00	1019.68	1265.07	305.52
4.81	322.99	312.23	542.98	1020.00	1265.60	305.52
4.82	322.98	312.22	542.96	1020.32	1266.14	305.52
4.83	322.97	312.20	542.94	1020.64	1266.68	305.52
4.84	322.95	312.19	542.92	1020.96	1267.21	305.52
4.85	322.94	312.18	542.90	1021.28	1267.74	305.52
4.86	322.93	312.17	542.88	1021.60	1268.27	305.52
4.87	322.92	312.15	542.86	1021.92	1268.81	305.52
4.88	322.90	312.14	542.84	1022.24	1269.34	305.52
4.89	322.89	312.13	542.81	1022.55	1269.86	305.52
4.90	322.88	312.12	542.79	1022.87	1270.39	305.52
4.91	322.87	312.11	542.77	1023.18	1270.92	305.52
4.92	322.85	312.09	542.75	1023.50	1271.44	305.52
4.93	322.84	312.08	542.73	1023.81	1271.97	305.52
4.94	322.83	312.07	542.71	1024.13	1272.49	305.52
4.95	322.82	312.06	542.69	1024.44	1273.02	305.52
4.96	322.80	312.05	542.67	1024.75	1273.54	305.52
4.97	322.79	312.04	542.65	1025.06	1274.06	305.52
4.98	322.78	312.02	542.63	1025.37	1274.58	305.52
4.99	322.77	312.01	542.61	1025.68	1275.10	305.52
5.00	322.76	312.00	542.59	1025.99	1275.61	305.52

VREME (1.E-6)	T1 (K)	T2 (K)	T3 (K)	T4 (K)	T5 (K)	T (K)
5.01	322.74	311.99	542.57	1026.30	1276.13	305.52
5.02	322.73	311.98	542.55	1026.61	1276.65	305.52
5.03	322.72	311.97	542.53	1026.92	1277.16	305.52
5.04	322.71	311.95	542.51	1027.23	1277.68	305.52
5.05	322.69	311.94	542.49	1027.53	1278.19	305.52
5.06	322.68	311.93	542.47	1027.84	1278.70	305.52
5.07	322.67	311.92	542.45	1028.14	1279.21	305.52
5.08	322.66	311.91	542.43	1028.45	1279.72	305.52
5.09	322.65	311.90	542.41	1028.75	1280.23	305.52
5.10	322.64	311.89	542.39	1029.06	1280.74	305.52
5.11	322.62	311.87	542.37	1029.36	1281.25	305.52
5.12	322.61	311.86	542.35	1029.66	1281.76	305.52
5.13	322.60	311.85	542.33	1029.96	1282.26	305.52
5.14	322.59	311.84	542.31	1030.26	1282.77	305.52
5.15	322.58	311.83	542.29	1030.56	1283.27	305.52
5.16	322.56	311.82	542.28	1030.86	1283.77	305.52
5.17	322.55	311.81	542.26	1031.16	1284.27	305.52
5.18	322.54	311.80	542.24	1031.46	1284.77	305.52
5.19	322.53	311.79	542.22	1031.76	1285.27	305.52
5.20	322.52	311.77	542.20	1032.05	1285.77	305.52
5.21	322.51	311.76	542.18	1032.35	1286.27	305.52
5.22	322.50	311.75	542.16	1032.65	1286.77	305.52
5.23	322.48	311.74	542.14	1032.94	1287.27	305.52
5.24	322.47	311.73	542.12	1033.24	1287.76	305.52
5.25	322.46	311.72	542.10	1033.53	1288.26	305.52
5.26	322.45	311.71	542.09	1033.83	1288.75	305.52
5.27	322.44	311.70	542.07	1034.12	1289.24	305.52
5.28	322.43	311.69	542.05	1034.41	1289.74	305.52
5.29	322.42	311.68	542.03	1034.70	1290.23	305.52
5.30	322.40	311.67	542.01	1034.99	1290.72	305.52
5.31	322.39	311.66	541.99	1035.29	1291.21	305.52
5.32	322.38	311.64	541.97	1035.58	1291.70	305.52
5.33	322.37	311.63	541.96	1035.87	1292.18	305.52
5.34	322.36	311.62	541.94	1036.15	1292.67	305.52
5.35	322.35	311.61	541.92	1036.44	1293.16	305.52
5.36	322.34	311.60	541.90	1036.73	1293.64	305.52
5.37	322.33	311.59	541.88	1037.02	1294.13	305.52
5.38	322.32	311.58	541.87	1037.30	1294.61	305.52
5.39	322.31	311.57	541.85	1037.59	1295.09	305.52
5.40	322.29	311.56	541.83	1037.88	1295.57	305.52
5.41	322.28	311.55	541.81	1038.16	1296.05	305.52
5.42	322.27	311.54	541.79	1038.45	1296.53	305.52
5.43	322.26	311.53	541.78	1038.73	1297.01	305.52
5.44	322.25	311.52	541.76	1039.01	1297.49	305.52
5.45	322.24	311.51	541.74	1039.30	1297.97	305.52
5.46	322.23	311.50	541.72	1039.58	1298.45	305.52
5.47	322.22	311.49	541.70	1039.86	1298.92	305.52
5.48	322.21	311.48	541.69	1040.14	1299.40	305.52
5.49	322.20	311.47	541.67	1040.42	1299.87	305.52
5.50	322.19	311.46	541.65	1040.70	1300.35	305.52

VREME	T1	T2	T3	T4	T5	T
(1.E-6)	(K)	(K)	(K)	(K)	(K)	(K)
5.51	322.18	311.45	541.63	1040.98	1300.82	305.52
5.52	322.17	311.44	541.62	1041.26	1301.29	305.52
5.53	322.16	311.43	541.60	1041.54	1301.76	305.52
5.54	322.15	311.42	541.58	1041.82	1302.23	305.52
5.55	322.13	311.41	541.57	1042.10	1302.70	305.52
5.56	322.12	311.40	541.55	1042.37	1303.17	305.52
5.57	322.11	311.39	541.53	1042.65	1303.64	305.52
5.58	322.10	311.38	541.51	1042.93	1304.11	305.52
5.59	322.09	311.37	541.50	1043.20	1304.57	305.52
5.60	322.08	311.36	541.48	1043.48	1305.04	305.52
5.61	322.07	311.35	541.46	1043.75	1305.50	305.52
5.62	322.06	311.34	541.45	1044.03	1305.97	305.52
5.63	322.05	311.33	541.43	1044.30	1306.43	305.52
5.64	322.04	311.32	541.41	1044.57	1306.89	305.52
5.65	322.03	311.31	541.40	1044.85	1307.35	305.52
5.66	322.02	311.30	541.38	1045.12	1307.82	305.52
5.67	322.01	311.29	541.36	1045.39	1308.28	305.52
5.68	322.00	311.28	541.35	1045.66	1308.73	305.52
5.69	321.99	311.27	541.33	1045.93	1309.19	305.52
5.70	321.98	311.26	541.31	1046.20	1309.65	305.52
5.71	321.97	311.25	541.30	1046.47	1310.11	305.52
5.72	321.96	311.24	541.28	1046.74	1310.56	305.52
5.73	321.95	311.23	541.26	1047.01	1311.02	305.52
5.74	321.94	311.22	541.25	1047.28	1311.48	305.52
5.75	321.93	311.21	541.23	1047.54	1311.93	305.52
5.76	321.92	311.20	541.21	1047.81	1312.38	305.52
5.77	321.91	311.20	541.20	1048.08	1312.84	305.52
5.78	321.90	311.19	541.18	1048.34	1313.29	305.52
5.79	321.89	311.18	541.17	1048.61	1313.74	305.52
5.80	321.88	311.17	541.15	1048.87	1314.19	305.52
5.81	321.87	311.16	541.13	1049.14	1314.64	305.52
5.82	321.86	311.15	541.12	1049.40	1315.09	305.52
5.83	321.85	311.14	541.10	1049.67	1315.54	305.52
5.84	321.84	311.13	541.09	1049.93	1315.98	305.52
5.85	321.84	311.12	541.07	1050.19	1316.43	305.52
5.86	321.83	311.11	541.06	1050.45	1316.88	305.52
5.87	321.82	311.10	541.04	1050.72	1317.32	305.52
5.88	321.81	311.09	541.02	1050.98	1317.77	305.52
5.89	321.80	311.08	541.01	1051.24	1318.21	305.52
5.90	321.79	311.08	540.99	1051.50	1318.65	305.52
5.91	321.78	311.07	540.98	1051.76	1319.10	305.52
5.92	321.77	311.06	540.96	1052.02	1319.54	305.52
5.93	321.76	311.05	540.95	1052.28	1319.98	305.52
5.94	321.75	311.04	540.93	1052.53	1320.42	305.52
5.95	321.74	311.03	540.92	1052.79	1320.86	305.52
5.96	321.73	311.02	540.90	1053.05	1321.30	305.52
5.97	321.72	311.01	540.88	1053.31	1321.74	305.52
5.98	321.71	311.00	540.87	1053.56	1322.17	305.52
5.99	321.70	311.00	540.85	1053.82	1322.61	305.52
6.00	321.69	310.99	540.84	1054.08	1323.05	305.52

VREME	KIN. ENER.	VIBR. ENER.	ELEK. ENER.	IZL. ENER.
(1.E-6)	(J/cm ³)	(J/cm ³)	(J/cm ³)	(J/cm ³)
.00	.19192420	.5666E-02	.0000	.0000
.01	.19192420	.5669E-02	.2059E-05	-.6400E-24
.02	.19192420	.5676E-02	.8233E-05	-.1559E-23
.03	.19192420	.5686E-02	.1852E-04	-.3084E-23
.04	.19192420	.5701E-02	.3291E-04	-.5538E-23
.05	.19192420	.5720E-02	.5139E-04	-.9267E-23
.06	.19192420	.5743E-02	.7394E-04	-.1465E-22
.07	.19192420	.5770E-02	.1006E-03	-.2213E-22
.08	.19192420	.5801E-02	.1312E-03	-.3219E-22
.09	.19192420	.5836E-02	.1659E-03	-.4542E-22
.10	.19192420	.5875E-02	.2046E-03	-.6251E-22
.11	.19192420	.5918E-02	.2472E-03	-.8434E-22
.12	.19192420	.5964E-02	.2938E-03	-.1120E-21
.13	.19192420	.6015E-02	.3442E-03	-.1469E-21
.14	.19192420	.6069E-02	.3985E-03	-.1909E-21
.15	.19192420	.6127E-02	.4567E-03	-.2468E-21
.16	.19192420	.6189E-02	.5186E-03	-.3182E-21
.17	.19192420	.6254E-02	.5843E-03	-.4112E-21
.18	.19192420	.6323E-02	.6536E-03	-.5355E-21
.19	.19192420	.6396E-02	.7266E-03	-.7094E-21
.20	.19192420	.6472E-02	.8032E-03	-.9729E-21
.21	.19192420	.6549E-02	.8813E-03	-.1444E-20
.22	.19192420	.6626E-02	.9588E-03	-.2819E-20
.23	.19192420	.6702E-02	.1036E-02	-.6440E-18
.24	.19192420	.6777E-02	.1112E-02	-.2109E-07
.25	.19192420	.6824E-02	.1188E-02	-.1934E-04
.26	.19192420	.6887E-02	.1263E-02	-.3391E-04
.27	.19192420	.6950E-02	.1338E-02	-.4538E-04
.28	.19192420	.7011E-02	.1413E-02	-.5624E-04
.29	.19192420	.7072E-02	.1486E-02	-.6697E-04
.30	.19192420	.7133E-02	.1560E-02	-.7765E-04
.31	.19192420	.7193E-02	.1632E-02	-.8826E-04
.32	.19192420	.7252E-02	.1705E-02	-.9881E-04
.33	.19192420	.7310E-02	.1776E-02	-.1093E-03
.34	.19192420	.7367E-02	.1848E-02	-.1197E-03
.35	.19192420	.7424E-02	.1919E-02	-.1301E-03
.36	.19192420	.7481E-02	.1989E-02	-.1404E-03
.37	.19192420	.7536E-02	.2059E-02	-.1507E-03
.38	.19192420	.7591E-02	.2128E-02	-.1609E-03
.39	.19192420	.7646E-02	.2198E-02	-.1710E-03
.40	.19192420	.7700E-02	.2266E-02	-.1811E-03
.41	.19192420	.7753E-02	.2334E-02	-.1912E-03
.42	.19192420	.7805E-02	.2402E-02	-.2011E-03
.43	.19192420	.7857E-02	.2469E-02	-.2111E-03
.44	.19192420	.7909E-02	.2536E-02	-.2210E-03
.45	.19192420	.7960E-02	.2603E-02	-.2308E-03
.46	.19192420	.8010E-02	.2669E-02	-.2406E-03
.47	.19192420	.8060E-02	.2734E-02	-.2503E-03
.48	.19192420	.8109E-02	.2800E-02	-.2600E-03
.49	.19192420	.8158E-02	.2864E-02	-.2696E-03
.50	.19192420	.8206E-02	.2929E-02	-.2792E-03

VREME	KIN. ENER.	VIBR. ENER.	ELEK. ENER.	IZL. ENER.
(1.E-6)	(J/cm ³)	(J/cm ³)	(J/cm ³)	(J/cm ³)
.51	.19192420	.8254E-02	.2993E-02	-.2887E-03
.52	.19192420	.8301E-02	.3057E-02	-.2982E-03
.53	.19192420	.8348E-02	.3120E-02	-.3076E-03
.54	.19192420	.8394E-02	.3183E-02	-.3170E-03
.55	.19192420	.8440E-02	.3245E-02	-.3264E-03
.56	.19192420	.8485E-02	.3308E-02	-.3357E-03
.57	.19192420	.8530E-02	.3370E-02	-.3450E-03
.58	.19192420	.8574E-02	.3431E-02	-.3542E-03
.59	.19192420	.8618E-02	.3492E-02	-.3633E-03
.60	.19192420	.8661E-02	.3553E-02	-.3725E-03
.61	.19192420	.8704E-02	.3613E-02	-.3815E-03
.62	.19192420	.8747E-02	.3674E-02	-.3906E-03
.63	.19192420	.8789E-02	.3733E-02	-.3996E-03
.64	.19192420	.8830E-02	.3793E-02	-.4085E-03
.65	.19192420	.8872E-02	.3852E-02	-.4175E-03
.66	.19192420	.8912E-02	.3911E-02	-.4263E-03
.67	.19193090	.8953E-02	.3969E-02	-.4352E-03
.68	.19195050	.8993E-02	.4027E-02	-.4439E-03
.69	.19197000	.9033E-02	.4085E-02	-.4527E-03
.70	.19198950	.9072E-02	.4143E-02	-.4614E-03
.71	.19200900	.9111E-02	.4200E-02	-.4701E-03
.72	.19202850	.9150E-02	.4257E-02	-.4787E-03
.73	.19204810	.9188E-02	.4314E-02	-.4873E-03
.74	.19206760	.9226E-02	.4370E-02	-.4959E-03
.75	.19208710	.9264E-02	.4426E-02	-.5044E-03
.76	.19210660	.9301E-02	.4482E-02	-.5128E-03
.77	.19212620	.9338E-02	.4537E-02	-.5213E-03
.78	.19214570	.9375E-02	.4592E-02	-.5297E-03
.79	.19216520	.9411E-02	.4647E-02	-.5380E-03
.80	.19218470	.9447E-02	.4702E-02	-.5464E-03
.81	.19220430	.9483E-02	.4756E-02	-.5547E-03
.82	.19222380	.9518E-02	.4810E-02	-.5629E-03
.83	.19224330	.9553E-02	.4864E-02	-.5711E-03
.84	.19226280	.9588E-02	.4917E-02	-.5793E-03
.85	.19228230	.9623E-02	.4971E-02	-.5875E-03
.86	.19230190	.9657E-02	.5024E-02	-.5956E-03
.87	.19232140	.9691E-02	.5076E-02	-.6036E-03
.88	.19234090	.9725E-02	.5129E-02	-.6117E-03
.89	.19236040	.9758E-02	.5181E-02	-.6197E-03
.90	.19238000	.9791E-02	.5233E-02	-.6277E-03
.91	.19239950	.9824E-02	.5285E-02	-.6356E-03
.92	.19241900	.9857E-02	.5336E-02	-.6435E-03
.93	.19243850	.9889E-02	.5387E-02	-.6514E-03
.94	.19245810	.9921E-02	.5438E-02	-.6592E-03
.95	.19247760	.9953E-02	.5489E-02	-.6670E-03
.96	.19249710	.9985E-02	.5540E-02	-.6748E-03
.97	.19251660	.1002E-01	.5590E-02	-.6825E-03
.98	.19253620	.1005E-01	.5640E-02	-.6902E-03
.99	.19255570	.1008E-01	.5690E-02	-.6979E-03
1.00	.19257520	.1011E-01	.5739E-02	-.7056E-03

VREME	KIN. ENER.	VIBR. ENER.	ELEK. ENER.	IZL. ENER.
(1.E-6)	(J/cm ³)	(J/cm ³)	(J/cm ³)	(J/cm ³)
1.01	.19259470	.1014E-01	.5789E-02	-.7132E-03
1.02	.19261430	.1017E-01	.5838E-02	-.7208E-03
1.03	.19263380	.1020E-01	.5886E-02	-.7283E-03
1.04	.19265330	.1023E-01	.5935E-02	-.7358E-03
1.05	.19267280	.1026E-01	.5984E-02	-.7434E-03
1.06	.19269230	.1029E-01	.6032E-02	-.7508E-03
1.07	.19271190	.1032E-01	.6080E-02	-.7583E-03
1.08	.19273140	.1035E-01	.6128E-02	-.7657E-03
1.09	.19275090	.1038E-01	.6175E-02	-.7730E-03
1.10	.19277040	.1040E-01	.6222E-02	-.7804E-03
1.11	.19279000	.1043E-01	.6270E-02	-.7877E-03
1.12	.19280950	.1046E-01	.6317E-02	-.7950E-03
1.13	.19282900	.1049E-01	.6363E-02	-.8023E-03
1.14	.19284850	.1052E-01	.6410E-02	-.8095E-03
1.15	.19286810	.1054E-01	.6456E-02	-.8167E-03
1.16	.19288760	.1057E-01	.6502E-02	-.8239E-03
1.17	.19290710	.1060E-01	.6548E-02	-.8310E-03
1.18	.19292660	.1063E-01	.6594E-02	-.8382E-03
1.19	.19294620	.1065E-01	.6640E-02	-.8452E-03
1.20	.19296570	.1068E-01	.6685E-02	-.8523E-03
1.21	.19298520	.1070E-01	.6730E-02	-.8594E-03
1.22	.19300470	.1073E-01	.6775E-02	-.8664E-03
1.23	.19302420	.1076E-01	.6820E-02	-.8734E-03
1.24	.19304380	.1078E-01	.6864E-02	-.8803E-03
1.25	.19306330	.1081E-01	.6909E-02	-.8872E-03
1.26	.19308280	.1083E-01	.6953E-02	-.8942E-03
1.27	.19310230	.1086E-01	.6997E-02	-.9010E-03
1.28	.19312190	.1089E-01	.7041E-02	-.9079E-03
1.29	.19314140	.1091E-01	.7085E-02	-.9147E-03
1.30	.19316090	.1094E-01	.7128E-02	-.9215E-03
1.31	.19318040	.1096E-01	.7172E-02	-.9283E-03
1.32	.19320000	.1099E-01	.7215E-02	-.9351E-03
1.33	.19321950	.1101E-01	.7258E-02	-.9418E-03
1.34	.19323900	.1103E-01	.7300E-02	-.9485E-03
1.35	.19325850	.1106E-01	.7343E-02	-.9552E-03
1.36	.19327800	.1108E-01	.7386E-02	-.9619E-03
1.37	.19329760	.1111E-01	.7428E-02	-.9685E-03
1.38	.19331710	.1113E-01	.7470E-02	-.9751E-03
1.39	.19333660	.1115E-01	.7512E-02	-.9817E-03
1.40	.19335610	.1118E-01	.7554E-02	-.9883E-03
1.41	.19337570	.1120E-01	.7596E-02	-.9948E-03
1.42	.19339520	.1122E-01	.7637E-02	-.1001E-02
1.43	.19341470	.1125E-01	.7678E-02	-.1008E-02
1.44	.19343420	.1127E-01	.7719E-02	-.1014E-02
1.45	.19345380	.1129E-01	.7761E-02	-.1021E-02
1.46	.19347330	.1132E-01	.7801E-02	-.1027E-02
1.47	.19349280	.1134E-01	.7842E-02	-.1034E-02
1.48	.19351230	.1136E-01	.7882E-02	-.1040E-02
1.49	.19353190	.1138E-01	.7923E-02	-.1046E-02
1.50	.19355140	.1141E-01	.7964E-02	-.1053E-02

VREME	KIN. ENER.	VIBR. ENER.	ELEK. ENER.	IZL. ENER.
(1.E-6)	(J/cm ³)	(J/cm ³)	(J/cm ³)	(J/cm ³)
1.51	.19357090	.1143E-01	.8003E-02	-.1059E-02
1.52	.19359040	.1145E-01	.8043E-02	-.1065E-02
1.53	.19361000	.1147E-01	.8083E-02	-.1072E-02
1.54	.19362950	.1149E-01	.8123E-02	-.1078E-02
1.55	.19364900	.1152E-01	.8162E-02	-.1084E-02
1.56	.19366850	.1154E-01	.8202E-02	-.1090E-02
1.57	.19368800	.1156E-01	.8241E-02	-.1096E-02
1.58	.19370760	.1158E-01	.8280E-02	-.1103E-02
1.59	.19372710	.1160E-01	.8319E-02	-.1109E-02
1.60	.19374660	.1162E-01	.8358E-02	-.1115E-02
1.61	.19376610	.1164E-01	.8396E-02	-.1121E-02
1.62	.19378570	.1167E-01	.8435E-02	-.1127E-02
1.63	.19380520	.1169E-01	.8473E-02	-.1133E-02
1.64	.19382470	.1171E-01	.8511E-02	-.1139E-02
1.65	.19384420	.1173E-01	.8550E-02	-.1145E-02
1.66	.19386380	.1175E-01	.8588E-02	-.1151E-02
1.67	.19388330	.1177E-01	.8625E-02	-.1157E-02
1.68	.19390280	.1179E-01	.8663E-02	-.1163E-02
1.69	.19392230	.1181E-01	.8700E-02	-.1169E-02
1.70	.19394180	.1183E-01	.8738E-02	-.1175E-02
1.71	.19396140	.1185E-01	.8775E-02	-.1181E-02
1.72	.19398090	.1187E-01	.8813E-02	-.1187E-02
1.73	.19400040	.1189E-01	.8850E-02	-.1193E-02
1.74	.19401990	.1191E-01	.8886E-02	-.1198E-02
1.75	.19403950	.1193E-01	.8923E-02	-.1204E-02
1.76	.19405900	.1195E-01	.8960E-02	-.1210E-02
1.77	.19407850	.1197E-01	.8997E-02	-.1216E-02
1.78	.19409800	.1199E-01	.9033E-02	-.1222E-02
1.79	.19411760	.1201E-01	.9069E-02	-.1227E-02
1.80	.19413710	.1203E-01	.9105E-02	-.1233E-02
1.81	.19415660	.1205E-01	.9141E-02	-.1239E-02
1.82	.19417610	.1206E-01	.9177E-02	-.1244E-02
1.83	.19419570	.1208E-01	.9213E-02	-.1250E-02
1.84	.19421520	.1210E-01	.9249E-02	-.1256E-02
1.85	.19423470	.1212E-01	.9284E-02	-.1261E-02
1.86	.19425420	.1214E-01	.9320E-02	-.1267E-02
1.87	.19427380	.1216E-01	.9355E-02	-.1273E-02
1.88	.19429330	.1218E-01	.9390E-02	-.1278E-02
1.89	.19431280	.1220E-01	.9425E-02	-.1284E-02
1.90	.19433230	.1222E-01	.9461E-02	-.1289E-02
1.91	.19435190	.1223E-01	.9496E-02	-.1295E-02
1.92	.19437140	.1225E-01	.9530E-02	-.1300E-02
1.93	.19439090	.1227E-01	.9565E-02	-.1306E-02
1.94	.19441040	.1229E-01	.9599E-02	-.1311E-02
1.95	.19442990	.1231E-01	.9634E-02	-.1317E-02
1.96	.19444950	.1233E-01	.9668E-02	-.1322E-02
1.97	.19446900	.1234E-01	.9703E-02	-.1328E-02
1.98	.19448850	.1236E-01	.9736E-02	-.1333E-02
1.99	.19450800	.1238E-01	.9770E-02	-.1338E-02
2.00	.19452760	.1240E-01	.9804E-02	-.1344E-02

VREME	KIN. ENER.	VIBR. ENER.	ELEK. ENER.	IZL. ENER.
(1.E-6)	(J/cm ³)	(J/cm ³)	(J/cm ³)	(J/cm ³)
2.01	.19454710	.1241E-01	.9838E-02	-.1349E-02
2.02	.19456660	.1243E-01	.9871E-02	-.1355E-02
2.03	.19458610	.1245E-01	.9905E-02	-.1360E-02
2.04	.19460560	.1247E-01	.9939E-02	-.1365E-02
2.05	.19462520	.1249E-01	.9972E-02	-.1370E-02
2.06	.19464470	.1250E-01	.1001E-01	-.1376E-02
2.07	.19466420	.1252E-01	.1004E-01	-.1381E-02
2.08	.19468370	.1254E-01	.1007E-01	-.1386E-02
2.09	.19470330	.1255E-01	.1010E-01	-.1392E-02
2.10	.19472280	.1257E-01	.1014E-01	-.1397E-02
2.11	.19474230	.1259E-01	.1017E-01	-.1402E-02
2.12	.19476180	.1261E-01	.1020E-01	-.1407E-02
2.13	.19478140	.1262E-01	.1024E-01	-.1412E-02
2.14	.19480090	.1264E-01	.1027E-01	-.1417E-02
2.15	.19482040	.1266E-01	.1030E-01	-.1423E-02
2.16	.19483990	.1267E-01	.1033E-01	-.1428E-02
2.17	.19485950	.1269E-01	.1036E-01	-.1433E-02
2.18	.19487900	.1271E-01	.1040E-01	-.1438E-02
2.19	.19489850	.1272E-01	.1043E-01	-.1443E-02
2.20	.19491800	.1274E-01	.1046E-01	-.1448E-02
2.21	.19493760	.1276E-01	.1049E-01	-.1453E-02
2.22	.19495710	.1277E-01	.1052E-01	-.1458E-02
2.23	.19497660	.1279E-01	.1056E-01	-.1463E-02
2.24	.19499610	.1281E-01	.1059E-01	-.1468E-02
2.25	.19501560	.1282E-01	.1062E-01	-.1473E-02
2.26	.19503520	.1284E-01	.1065E-01	-.1478E-02
2.27	.19505470	.1286E-01	.1068E-01	-.1483E-02
2.28	.19507420	.1287E-01	.1071E-01	-.1488E-02
2.29	.19509370	.1289E-01	.1074E-01	-.1493E-02
2.30	.19511330	.1291E-01	.1077E-01	-.1498E-02
2.31	.19513280	.1292E-01	.1080E-01	-.1503E-02
2.32	.19515230	.1294E-01	.1084E-01	-.1508E-02
2.33	.19517180	.1295E-01	.1087E-01	-.1513E-02
2.34	.19519140	.1297E-01	.1090E-01	-.1517E-02
2.35	.19521090	.1299E-01	.1093E-01	-.1522E-02
2.36	.19523040	.1300E-01	.1096E-01	-.1527E-02
2.37	.19524990	.1302E-01	.1099E-01	-.1532E-02
2.38	.19526950	.1303E-01	.1102E-01	-.1537E-02
2.39	.19528900	.1305E-01	.1105E-01	-.1541E-02
2.40	.19530850	.1306E-01	.1108E-01	-.1546E-02
2.41	.19532800	.1308E-01	.1111E-01	-.1551E-02
2.42	.19534750	.1310E-01	.1114E-01	-.1556E-02
2.43	.19536710	.1311E-01	.1117E-01	-.1561E-02
2.44	.19538660	.1313E-01	.1120E-01	-.1565E-02
2.45	.19540610	.1314E-01	.1123E-01	-.1570E-02
2.46	.19542560	.1316E-01	.1126E-01	-.1575E-02
2.47	.19544520	.1317E-01	.1129E-01	-.1579E-02
2.48	.19545450	.1319E-01	.1132E-01	-.1584E-02
2.49	.19545450	.1320E-01	.1135E-01	-.1589E-02
2.50	.19545450	.1322E-01	.1137E-01	-.1593E-02

VREME	KIN. ENER.	VIBR. ENER.	ELEK. ENER.	IZL. ENER.
(1.E-6)	(J/cm ³)	(J/cm ³)	(J/cm ³)	(J/cm ³)
2.51	.19545450	.1323E-01	.1140E-01	-.1598E-02
2.52	.19545450	.1325E-01	.1143E-01	-.1603E-02
2.53	.19545450	.1326E-01	.1146E-01	-.1607E-02
2.54	.19545450	.1328E-01	.1149E-01	-.1612E-02
2.55	.19545450	.1329E-01	.1152E-01	-.1617E-02
2.56	.19545450	.1331E-01	.1155E-01	-.1621E-02
2.57	.19545450	.1332E-01	.1158E-01	-.1626E-02
2.58	.19545450	.1334E-01	.1161E-01	-.1630E-02
2.59	.19545450	.1335E-01	.1163E-01	-.1635E-02
2.60	.19545450	.1337E-01	.1166E-01	-.1639E-02
2.61	.19545450	.1338E-01	.1169E-01	-.1644E-02
2.62	.19545450	.1340E-01	.1172E-01	-.1648E-02
2.63	.19545450	.1341E-01	.1175E-01	-.1653E-02
2.64	.19545450	.1343E-01	.1178E-01	-.1657E-02
2.65	.19545450	.1344E-01	.1180E-01	-.1662E-02
2.66	.19545450	.1346E-01	.1183E-01	-.1666E-02
2.67	.19545450	.1347E-01	.1186E-01	-.1671E-02
2.68	.19545450	.1348E-01	.1189E-01	-.1675E-02
2.69	.19545450	.1350E-01	.1192E-01	-.1680E-02
2.70	.19545450	.1351E-01	.1194E-01	-.1684E-02
2.71	.19545450	.1353E-01	.1197E-01	-.1689E-02
2.72	.19545450	.1354E-01	.1200E-01	-.1693E-02
2.73	.19545450	.1355E-01	.1203E-01	-.1697E-02
2.74	.19545450	.1357E-01	.1205E-01	-.1702E-02
2.75	.19545450	.1358E-01	.1208E-01	-.1706E-02
2.76	.19545450	.1359E-01	.1211E-01	-.1710E-02
2.77	.19545450	.1361E-01	.1214E-01	-.1715E-02
2.78	.19545450	.1362E-01	.1216E-01	-.1719E-02
2.79	.19545450	.1364E-01	.1219E-01	-.1723E-02
2.80	.19545450	.1365E-01	.1222E-01	-.1728E-02
2.81	.19545450	.1366E-01	.1224E-01	-.1732E-02
2.82	.19545450	.1368E-01	.1227E-01	-.1737E-02
2.83	.19545450	.1369E-01	.1230E-01	-.1741E-02
2.84	.19545450	.1370E-01	.1232E-01	-.1745E-02
2.85	.19545450	.1372E-01	.1235E-01	-.1749E-02
2.86	.19545450	.1373E-01	.1238E-01	-.1754E-02
2.87	.19545450	.1374E-01	.1240E-01	-.1758E-02
2.88	.19545450	.1376E-01	.1243E-01	-.1762E-02
2.89	.19545450	.1377E-01	.1246E-01	-.1766E-02
2.90	.19545450	.1378E-01	.1248E-01	-.1770E-02
2.91	.19545450	.1379E-01	.1251E-01	-.1775E-02
2.92	.19545450	.1381E-01	.1254E-01	-.1779E-02
2.93	.19545450	.1382E-01	.1256E-01	-.1783E-02
2.94	.19545450	.1383E-01	.1259E-01	-.1787E-02
2.95	.19545450	.1385E-01	.1261E-01	-.1791E-02
2.96	.19545450	.1386E-01	.1264E-01	-.1796E-02
2.97	.19545450	.1387E-01	.1267E-01	-.1800E-02
2.98	.19545450	.1388E-01	.1269E-01	-.1804E-02
2.99	.19545450	.1390E-01	.1272E-01	-.1808E-02
3.00	.19545450	.1391E-01	.1274E-01	-.1812E-02

VREME	KIN. ENER.	VIBR.ENER.	ELEK.ENER.	IZL.ENER.
(1.E-6)	(J/cm ³)	(J/cm ³)	(J/cm ³)	(J/cm ³)
3.01	.19545450	.1392E-01	.1277E-01	-.1816E-02
3.02	.19545450	.1393E-01	.1279E-01	-.1821E-02
3.03	.19545450	.1395E-01	.1282E-01	-.1825E-02
3.04	.19545450	.1396E-01	.1284E-01	-.1829E-02
3.05	.19545450	.1397E-01	.1287E-01	-.1833E-02
3.06	.19545450	.1398E-01	.1289E-01	-.1837E-02
3.07	.19545450	.1400E-01	.1292E-01	-.1841E-02
3.08	.19545450	.1401E-01	.1295E-01	-.1845E-02
3.09	.19545450	.1402E-01	.1297E-01	-.1849E-02
3.10	.19545450	.1403E-01	.1300E-01	-.1853E-02
3.11	.19545450	.1405E-01	.1302E-01	-.1857E-02
3.12	.19545450	.1406E-01	.1305E-01	-.1861E-02
3.13	.19545450	.1407E-01	.1307E-01	-.1865E-02
3.14	.19545450	.1408E-01	.1310E-01	-.1869E-02
3.15	.19545450	.1409E-01	.1312E-01	-.1873E-02
3.16	.19545450	.1411E-01	.1315E-01	-.1877E-02
3.17	.19545450	.1412E-01	.1317E-01	-.1881E-02
3.18	.19545450	.1413E-01	.1320E-01	-.1885E-02
3.19	.19545450	.1414E-01	.1322E-01	-.1889E-02
3.20	.19545450	.1415E-01	.1325E-01	-.1893E-02
3.21	.19545450	.1417E-01	.1327E-01	-.1897E-02
3.22	.19545450	.1418E-01	.1329E-01	-.1901E-02
3.23	.19545450	.1419E-01	.1332E-01	-.1905E-02
3.24	.19545450	.1420E-01	.1334E-01	-.1909E-02
3.25	.19545450	.1421E-01	.1337E-01	-.1913E-02
3.26	.19545450	.1422E-01	.1339E-01	-.1916E-02
3.27	.19545450	.1424E-01	.1341E-01	-.1920E-02
3.28	.19545450	.1425E-01	.1344E-01	-.1924E-02
3.29	.19545450	.1426E-01	.1346E-01	-.1928E-02
3.30	.19545450	.1427E-01	.1349E-01	-.1932E-02
3.31	.19545450	.1428E-01	.1351E-01	-.1936E-02
3.32	.19545450	.1429E-01	.1353E-01	-.1940E-02
3.33	.19545450	.1430E-01	.1356E-01	-.1944E-02
3.34	.19545450	.1432E-01	.1358E-01	-.1948E-02
3.35	.19545450	.1433E-01	.1361E-01	-.1951E-02
3.36	.19545450	.1434E-01	.1363E-01	-.1955E-02
3.37	.19545450	.1435E-01	.1365E-01	-.1959E-02
3.38	.19545450	.1436E-01	.1368E-01	-.1963E-02
3.39	.19545450	.1437E-01	.1370E-01	-.1966E-02
3.40	.19545450	.1438E-01	.1373E-01	-.1970E-02
3.41	.19545450	.1440E-01	.1375E-01	-.1974E-02
3.42	.19545450	.1441E-01	.1377E-01	-.1978E-02
3.43	.19545450	.1442E-01	.1380E-01	-.1981E-02
3.44	.19545450	.1443E-01	.1382E-01	-.1985E-02
3.45	.19545450	.1444E-01	.1384E-01	-.1989E-02
3.46	.19545450	.1445E-01	.1387E-01	-.1993E-02
3.47	.19545450	.1446E-01	.1389E-01	-.1996E-02
3.48	.19545450	.1447E-01	.1391E-01	-.2000E-02
3.49	.19545450	.1448E-01	.1393E-01	-.2004E-02
3.50	.19545450	.1449E-01	.1396E-01	-.2008E-02

VREME	KIN. ENER.	VIBR. ENER.	ELEK. ENER.	IZL. ENER.
(1.E-6)	(J/cm ³)	(J/cm ³)	(J/cm ³)	(J/cm ³)
3.51	.19545450	.1451E-01	.1398E-01	-.2012E-02
3.52	.19545450	.1452E-01	.1400E-01	-.2015E-02
3.53	.19545450	.1453E-01	.1402E-01	-.2019E-02
3.54	.19545450	.1454E-01	.1405E-01	-.2022E-02
3.55	.19545450	.1455E-01	.1407E-01	-.2026E-02
3.56	.19545450	.1456E-01	.1409E-01	-.2030E-02
3.57	.19545450	.1457E-01	.1411E-01	-.2033E-02
3.58	.19545450	.1458E-01	.1414E-01	-.2037E-02
3.59	.19545450	.1459E-01	.1416E-01	-.2041E-02
3.60	.19545450	.1460E-01	.1418E-01	-.2044E-02
3.61	.19545450	.1461E-01	.1420E-01	-.2048E-02
3.62	.19545450	.1462E-01	.1423E-01	-.2051E-02
3.63	.19545450	.1463E-01	.1425E-01	-.2055E-02
3.64	.19545450	.1464E-01	.1427E-01	-.2059E-02
3.65	.19545450	.1466E-01	.1429E-01	-.2062E-02
3.66	.19545450	.1467E-01	.1432E-01	-.2066E-02
3.67	.19545450	.1468E-01	.1434E-01	-.2069E-02
3.68	.19545450	.1469E-01	.1436E-01	-.2073E-02
3.69	.19545450	.1470E-01	.1438E-01	-.2077E-02
3.70	.19545450	.1471E-01	.1441E-01	-.2080E-02
3.71	.19545450	.1472E-01	.1443E-01	-.2084E-02
3.72	.19545450	.1473E-01	.1445E-01	-.2087E-02
3.73	.19545450	.1474E-01	.1447E-01	-.2091E-02
3.74	.19545450	.1475E-01	.1450E-01	-.2094E-02
3.75	.19545450	.1476E-01	.1452E-01	-.2098E-02
3.76	.19545450	.1477E-01	.1454E-01	-.2101E-02
3.77	.19545450	.1478E-01	.1456E-01	-.2105E-02
3.78	.19545450	.1479E-01	.1458E-01	-.2108E-02
3.79	.19545450	.1480E-01	.1460E-01	-.2112E-02
3.80	.19545450	.1481E-01	.1463E-01	-.2115E-02
3.81	.19545450	.1482E-01	.1465E-01	-.2119E-02
3.82	.19545450	.1483E-01	.1467E-01	-.2122E-02
3.83	.19545450	.1484E-01	.1469E-01	-.2126E-02
3.84	.19545450	.1485E-01	.1471E-01	-.2129E-02
3.85	.19545450	.1486E-01	.1473E-01	-.2132E-02
3.86	.19545450	.1487E-01	.1475E-01	-.2136E-02
3.87	.19545450	.1488E-01	.1477E-01	-.2139E-02
3.88	.19545450	.1489E-01	.1479E-01	-.2143E-02
3.89	.19545450	.1490E-01	.1481E-01	-.2146E-02
3.90	.19545450	.1491E-01	.1484E-01	-.2150E-02
3.91	.19545450	.1492E-01	.1486E-01	-.2153E-02
3.92	.19545450	.1493E-01	.1488E-01	-.2157E-02
3.93	.19545450	.1494E-01	.1490E-01	-.2160E-02
3.94	.19545450	.1495E-01	.1492E-01	-.2164E-02
3.95	.19545450	.1496E-01	.1494E-01	-.2167E-02
3.96	.19545450	.1497E-01	.1496E-01	-.2170E-02
3.97	.19545450	.1498E-01	.1498E-01	-.2174E-02
3.98	.19545450	.1499E-01	.1500E-01	-.2177E-02
3.99	.19545450	.1500E-01	.1502E-01	-.2180E-02
4.00	.19545450	.1501E-01	.1505E-01	-.2183E-02

VREME	KIN. ENER.	VIBR. ENER.	ELEK. ENER.	IZL. ENER.
(1.E-6)	(J/cm ³)	(J/cm ³)	(J/cm ³)	(J/cm ³)
4.01	.19545450	.1502E-01	.1507E-01	-.2187E-02
4.02	.19545450	.1503E-01	.1509E-01	-.2190E-02
4.03	.19545450	.1504E-01	.1511E-01	-.2193E-02
4.04	.19545450	.1505E-01	.1513E-01	-.2197E-02
4.05	.19545450	.1506E-01	.1515E-01	-.2200E-02
4.06	.19545450	.1507E-01	.1517E-01	-.2203E-02
4.07	.19545450	.1508E-01	.1519E-01	-.2207E-02
4.08	.19545450	.1509E-01	.1521E-01	-.2210E-02
4.09	.19545450	.1510E-01	.1523E-01	-.2213E-02
4.10	.19545450	.1511E-01	.1526E-01	-.2217E-02
4.11	.19545450	.1512E-01	.1528E-01	-.2220E-02
4.12	.19545450	.1513E-01	.1530E-01	-.2223E-02
4.13	.19545450	.1514E-01	.1532E-01	-.2227E-02
4.14	.19545450	.1515E-01	.1534E-01	-.2230E-02
4.15	.19545450	.1515E-01	.1536E-01	-.2233E-02
4.16	.19545450	.1516E-01	.1538E-01	-.2236E-02
4.17	.19545450	.1517E-01	.1540E-01	-.2240E-02
4.18	.19545450	.1518E-01	.1542E-01	-.2243E-02
4.19	.19545450	.1519E-01	.1543E-01	-.2246E-02
4.20	.19545450	.1520E-01	.1545E-01	-.2249E-02
4.21	.19545450	.1521E-01	.1547E-01	-.2253E-02
4.22	.19545450	.1522E-01	.1549E-01	-.2256E-02
4.23	.19545450	.1523E-01	.1551E-01	-.2259E-02
4.24	.19545450	.1524E-01	.1553E-01	-.2262E-02
4.25	.19545450	.1525E-01	.1555E-01	-.2265E-02
4.26	.19545450	.1526E-01	.1557E-01	-.2268E-02
4.27	.19545450	.1527E-01	.1559E-01	-.2271E-02
4.28	.19545450	.1528E-01	.1561E-01	-.2275E-02
4.29	.19545450	.1529E-01	.1563E-01	-.2278E-02
4.30	.19545450	.1529E-01	.1565E-01	-.2281E-02
4.31	.19545450	.1530E-01	.1567E-01	-.2284E-02
4.32	.19545450	.1531E-01	.1569E-01	-.2287E-02
4.33	.19545450	.1532E-01	.1571E-01	-.2290E-02
4.34	.19545450	.1533E-01	.1573E-01	-.2294E-02
4.35	.19545450	.1534E-01	.1575E-01	-.2297E-02
4.36	.19545450	.1535E-01	.1577E-01	-.2300E-02
4.37	.19545450	.1536E-01	.1579E-01	-.2303E-02
4.38	.19545450	.1537E-01	.1581E-01	-.2306E-02
4.39	.19545450	.1538E-01	.1582E-01	-.2309E-02
4.40	.19545450	.1539E-01	.1584E-01	-.2313E-02
4.41	.19545450	.1540E-01	.1586E-01	-.2316E-02
4.42	.19545450	.1540E-01	.1588E-01	-.2319E-02
4.43	.19545450	.1541E-01	.1590E-01	-.2322E-02
4.44	.19545450	.1542E-01	.1592E-01	-.2325E-02
4.45	.19545450	.1543E-01	.1594E-01	-.2328E-02
4.46	.19545450	.1544E-01	.1596E-01	-.2331E-02
4.47	.19545450	.1545E-01	.1598E-01	-.2334E-02
4.48	.19545450	.1546E-01	.1600E-01	-.2337E-02
4.49	.19545450	.1547E-01	.1602E-01	-.2340E-02
4.50	.19545450	.1548E-01	.1604E-01	-.2343E-02

VREME	KIN. ENER.	VIBR. ENER.	ELEK. ENER.	IZL. ENER.
(1.E-6)	(J/cm ³)	(J/cm ³)	(J/cm ³)	(J/cm ³)
4.51	.19545450	.1549E-01	.1606E-01	-.2346E-02
4.52	.19545450	.1549E-01	.1608E-01	-.2349E-02
4.53	.19545450	.1550E-01	.1610E-01	-.2352E-02
4.54	.19545450	.1551E-01	.1612E-01	-.2355E-02
4.55	.19545450	.1552E-01	.1614E-01	-.2358E-02
4.56	.19545450	.1553E-01	.1615E-01	-.2361E-02
4.57	.19545450	.1554E-01	.1617E-01	-.2364E-02
4.58	.19545450	.1555E-01	.1619E-01	-.2367E-02
4.59	.19545450	.1556E-01	.1621E-01	-.2370E-02
4.60	.19545450	.1556E-01	.1623E-01	-.2373E-02
4.61	.19545450	.1557E-01	.1624E-01	-.2376E-02
4.62	.19545450	.1558E-01	.1626E-01	-.2379E-02
4.63	.19545450	.1559E-01	.1628E-01	-.2382E-02
4.64	.19545450	.1560E-01	.1630E-01	-.2385E-02
4.65	.19545450	.1561E-01	.1632E-01	-.2388E-02
4.66	.19545450	.1562E-01	.1633E-01	-.2391E-02
4.67	.19545450	.1563E-01	.1635E-01	-.2394E-02
4.68	.19545450	.1563E-01	.1637E-01	-.2397E-02
4.69	.19545450	.1564E-01	.1639E-01	-.2400E-02
4.70	.19545450	.1565E-01	.1641E-01	-.2403E-02
4.71	.19545450	.1566E-01	.1642E-01	-.2406E-02
4.72	.19545450	.1567E-01	.1644E-01	-.2409E-02
4.73	.19545450	.1568E-01	.1646E-01	-.2412E-02
4.74	.19545450	.1569E-01	.1648E-01	-.2415E-02
4.75	.19545450	.1569E-01	.1650E-01	-.2418E-02
4.76	.19545450	.1570E-01	.1651E-01	-.2421E-02
4.77	.19545450	.1571E-01	.1653E-01	-.2424E-02
4.78	.19545450	.1572E-01	.1655E-01	-.2427E-02
4.79	.19545450	.1573E-01	.1657E-01	-.2430E-02
4.80	.19545450	.1574E-01	.1659E-01	-.2432E-02
4.81	.19545450	.1575E-01	.1660E-01	-.2435E-02
4.82	.19545450	.1575E-01	.1662E-01	-.2438E-02
4.83	.19545450	.1576E-01	.1664E-01	-.2441E-02
4.84	.19545450	.1577E-01	.1666E-01	-.2444E-02
4.85	.19545450	.1578E-01	.1668E-01	-.2447E-02
4.86	.19545450	.1579E-01	.1669E-01	-.2450E-02
4.87	.19545450	.1580E-01	.1671E-01	-.2452E-02
4.88	.19545450	.1580E-01	.1673E-01	-.2455E-02
4.89	.19545450	.1581E-01	.1675E-01	-.2458E-02
4.90	.19545450	.1582E-01	.1677E-01	-.2461E-02
4.91	.19545450	.1583E-01	.1678E-01	-.2464E-02
4.92	.19545450	.1584E-01	.1680E-01	-.2467E-02
4.93	.19545450	.1585E-01	.1682E-01	-.2470E-02
4.94	.19545450	.1585E-01	.1684E-01	-.2472E-02
4.95	.19545450	.1586E-01	.1686E-01	-.2475E-02
4.96	.19545450	.1587E-01	.1687E-01	-.2478E-02
4.97	.19545450	.1588E-01	.1689E-01	-.2481E-02
4.98	.19545450	.1589E-01	.1691E-01	-.2484E-02
4.99	.19545450	.1590E-01	.1693E-01	-.2487E-02
5.00	.19545450	.1590E-01	.1695E-01	-.2490E-02

VREME	KIN. ENER.	VIBR. ENER.	ELEK. ENER.	IZL. ENER.
(1.E-6)	(J/cm ³)	(J/cm ³)	(J/cm ³)	(J/cm ³)
5.01	.19545450	.1591E-01	.1696E-01	-.2492E-02
5.02	.19545450	.1592E-01	.1698E-01	-.2495E-02
5.03	.19545450	.1593E-01	.1700E-01	-.2498E-02
5.04	.19545450	.1594E-01	.1702E-01	-.2501E-02
5.05	.19545450	.1595E-01	.1704E-01	-.2504E-02
5.06	.19545450	.1595E-01	.1705E-01	-.2506E-02
5.07	.19545450	.1596E-01	.1707E-01	-.2509E-02
5.08	.19545450	.1597E-01	.1708E-01	-.2512E-02
5.09	.19545450	.1598E-01	.1710E-01	-.2514E-02
5.10	.19545450	.1599E-01	.1712E-01	-.2517E-02
5.11	.19545450	.1599E-01	.1713E-01	-.2520E-02
5.12	.19545450	.1600E-01	.1715E-01	-.2523E-02
5.13	.19545450	.1601E-01	.1717E-01	-.2525E-02
5.14	.19545450	.1602E-01	.1718E-01	-.2528E-02
5.15	.19545450	.1603E-01	.1720E-01	-.2531E-02
5.16	.19545450	.1603E-01	.1722E-01	-.2533E-02
5.17	.19545450	.1604E-01	.1723E-01	-.2536E-02
5.18	.19545450	.1605E-01	.1725E-01	-.2539E-02
5.19	.19545450	.1606E-01	.1727E-01	-.2542E-02
5.20	.19545450	.1607E-01	.1728E-01	-.2544E-02
5.21	.19545450	.1607E-01	.1730E-01	-.2547E-02
5.22	.19545450	.1608E-01	.1732E-01	-.2550E-02
5.23	.19545450	.1609E-01	.1733E-01	-.2552E-02
5.24	.19545450	.1610E-01	.1735E-01	-.2555E-02
5.25	.19545450	.1611E-01	.1737E-01	-.2558E-02
5.26	.19545450	.1611E-01	.1738E-01	-.2561E-02
5.27	.19545450	.1612E-01	.1740E-01	-.2563E-02
5.28	.19545450	.1613E-01	.1741E-01	-.2566E-02
5.29	.19545450	.1614E-01	.1743E-01	-.2569E-02
5.30	.19545450	.1615E-01	.1745E-01	-.2571E-02
5.31	.19545450	.1615E-01	.1746E-01	-.2574E-02
5.32	.19545450	.1616E-01	.1748E-01	-.2577E-02
5.33	.19545450	.1617E-01	.1750E-01	-.2579E-02
5.34	.19545450	.1618E-01	.1751E-01	-.2582E-02
5.35	.19545450	.1619E-01	.1753E-01	-.2585E-02
5.36	.19545450	.1619E-01	.1755E-01	-.2588E-02
5.37	.19545450	.1620E-01	.1756E-01	-.2590E-02
5.38	.19545450	.1621E-01	.1758E-01	-.2593E-02
5.39	.19545450	.1622E-01	.1760E-01	-.2596E-02
5.40	.19545450	.1622E-01	.1761E-01	-.2598E-02
5.41	.19545450	.1623E-01	.1763E-01	-.2601E-02
5.42	.19545450	.1624E-01	.1765E-01	-.2604E-02
5.43	.19545450	.1625E-01	.1766E-01	-.2607E-02
5.44	.19545450	.1626E-01	.1768E-01	-.2609E-02
5.45	.19545450	.1626E-01	.1770E-01	-.2612E-02
5.46	.19545450	.1627E-01	.1771E-01	-.2615E-02
5.47	.19545450	.1628E-01	.1773E-01	-.2617E-02
5.48	.19545450	.1629E-01	.1775E-01	-.2620E-02
5.49	.19545450	.1629E-01	.1776E-01	-.2623E-02
5.50	.19545450	.1630E-01	.1778E-01	-.2626E-02

VREME	KIN. ENER.	VIBR. ENER.	ELEK. ENER.	IZL. ENER.
(1.E-6)	(J/cm ³)	(J/cm ³)	(J/cm ³)	(J/cm ³)
5.51	.19545450	.1631E-01	.1779E-01	-.2628E-02
5.52	.19545450	.1632E-01	.1781E-01	-.2631E-02
5.53	.19545450	.1632E-01	.1783E-01	-.2634E-02
5.54	.19545450	.1633E-01	.1784E-01	-.2636E-02
5.55	.19545450	.1634E-01	.1786E-01	-.2639E-02
5.56	.19545450	.1635E-01	.1788E-01	-.2642E-02
5.57	.19545450	.1635E-01	.1789E-01	-.2645E-02
5.58	.19545450	.1636E-01	.1791E-01	-.2647E-02
5.59	.19545450	.1637E-01	.1793E-01	-.2650E-02
5.60	.19545450	.1638E-01	.1794E-01	-.2652E-02
5.61	.19545450	.1638E-01	.1796E-01	-.2654E-02
5.62	.19545450	.1639E-01	.1798E-01	-.2657E-02
5.63	.19545450	.1640E-01	.1799E-01	-.2659E-02
5.64	.19545450	.1641E-01	.1801E-01	-.2662E-02
5.65	.19545450	.1642E-01	.1802E-01	-.2664E-02
5.66	.19545450	.1642E-01	.1804E-01	-.2666E-02
5.67	.19545450	.1643E-01	.1805E-01	-.2669E-02
5.68	.19545450	.1644E-01	.1807E-01	-.2671E-02
5.69	.19545450	.1645E-01	.1808E-01	-.2674E-02
5.70	.19545450	.1645E-01	.1810E-01	-.2676E-02
5.71	.19545450	.1646E-01	.1811E-01	-.2678E-02
5.72	.19545450	.1647E-01	.1813E-01	-.2681E-02
5.73	.19545450	.1647E-01	.1814E-01	-.2683E-02
5.74	.19545450	.1648E-01	.1816E-01	-.2686E-02
5.75	.19545450	.1649E-01	.1817E-01	-.2688E-02
5.76	.19545450	.1650E-01	.1819E-01	-.2690E-02
5.77	.19545450	.1650E-01	.1820E-01	-.2693E-02
5.78	.19545450	.1651E-01	.1822E-01	-.2695E-02
5.79	.19545450	.1652E-01	.1823E-01	-.2698E-02
5.80	.19545450	.1653E-01	.1825E-01	-.2700E-02
5.81	.19545450	.1653E-01	.1826E-01	-.2702E-02
5.82	.19545450	.1654E-01	.1828E-01	-.2705E-02
5.83	.19545450	.1655E-01	.1829E-01	-.2707E-02
5.84	.19545450	.1656E-01	.1831E-01	-.2710E-02
5.85	.19545450	.1656E-01	.1832E-01	-.2712E-02
5.86	.19545450	.1657E-01	.1834E-01	-.2715E-02
5.87	.19545450	.1658E-01	.1835E-01	-.2717E-02
5.88	.19545450	.1659E-01	.1837E-01	-.2719E-02
5.89	.19545450	.1659E-01	.1838E-01	-.2722E-02
5.90	.19545450	.1660E-01	.1840E-01	-.2724E-02
5.91	.19545450	.1661E-01	.1841E-01	-.2727E-02
5.92	.19545450	.1661E-01	.1843E-01	-.2729E-02
5.93	.19545450	.1662E-01	.1844E-01	-.2731E-02
5.94	.19545450	.1663E-01	.1846E-01	-.2734E-02
5.95	.19545450	.1664E-01	.1847E-01	-.2736E-02
5.96	.19545450	.1664E-01	.1849E-01	-.2739E-02
5.97	.19545450	.1665E-01	.1850E-01	-.2741E-02
5.98	.19545450	.1666E-01	.1852E-01	-.2743E-02
5.99	.19545450	.1667E-01	.1853E-01	-.2746E-02
6.00	.19545450	.1667E-01	.1855E-01	-.2748E-02

VREME (1.E-6)	POJACANJE (1/cm)	KONC. ELEKTRONA (1.E+12 1/cm ³)	IZL. SNAGA (W)
.00	-.7504	.0000000	.0000
.01	-.7504	.137182	.7200E-13
.02	-.7466	.274253	.1170E-12
.03	-.7387	.411108	.1934E-12
.04	-.7275	.547673	.3031E-12
.05	-.7130	.683819	.4491E-12
.06	-.6954	.819442	.6355E-12
.07	-.6745	.954399	.8679E-12
.08	-.6505	1.088637	.1154E-11
.09	-.6234	1.222060	.1503E-11
.10	-.5930	1.354572	.1930E-11
.11	-.5596	1.486084	.2454E-11
.12	-.5231	1.616513	.3101E-11
.13	-.4836	1.745852	.3911E-11
.14	-.4410	1.873932	.4942E-11
.15	-.3954	2.000674	.6287E-11
.16	-.3469	2.126004	.8099E-11
.17	-.2954	2.249851	.1065E-10
.18	-.2411	2.372145	.1450E-10
.19	-.1839	2.492826	.2088E-10
.20	-.1240	2.611439	.3346E-10
.21	-.6290E-01	2.592474	.6729E-10
.22	-.2283E-02	2.573782	.3073E-09
.23	.5788E-01	2.555359	.9295E-06
.24	.1138	2.537197	.6975E+05
.25	.4224E-02	2.519292	.1799E+07
.26	.5184E-02	2.501637	.1229E+07
.27	.5759E-02	2.484229	.1100E+07
.28	.5867E-02	2.467061	.1078E+07
.29	.5878E-02	2.450128	.1070E+07
.30	.5878E-02	2.433427	.1064E+07
.31	.5878E-02	2.416951	.1058E+07
.32	.5879E-02	2.400697	.1052E+07
.33	.5878E-02	2.384660	.1046E+07
.34	.5879E-02	2.368837	.1040E+07
.35	.5878E-02	2.353221	.1034E+07
.36	.5879E-02	2.337811	.1029E+07
.37	.5879E-02	2.322601	.1023E+07
.38	.5879E-02	2.307587	.1018E+07
.39	.5879E-02	2.292766	.1012E+07
.40	.5880E-02	2.278135	.1007E+07
.41	.5880E-02	2.263689	.1001E+07
.42	.5880E-02	2.249425	.9959E+06
.43	.5880E-02	2.235340	.9907E+06
.44	.5880E-02	2.221430	.9855E+06
.45	.5880E-02	2.207692	.9804E+06
.46	.5880E-02	2.194123	.9753E+06
.47	.5881E-02	2.180719	.9704E+06
.48	.5880E-02	2.167479	.9654E+06
.49	.5881E-02	2.154398	.9606E+06
.50	.5881E-02	2.141474	.9557E+06

VREME (1.E-6)	POJACANJE (1/cm)	KONC. ELEKTRONA (1.E+12 1/cm ³)	IZL. SNAGA (W)
.51	.5881E-02	2.128705	.9510E+06
.52	.5881E-02	2.116086	.9463E+06
.53	.5881E-02	2.103617	.9416E+06
.54	.5881E-02	2.091293	.9370E+06
.55	.5882E-02	2.079113	.9325E+06
.56	.5881E-02	2.067075	.9280E+06
.57	.5881E-02	2.055174	.9235E+06
.58	.5881E-02	2.043410	.9191E+06
.59	.5882E-02	2.031780	.9147E+06
.60	.5881E-02	2.020282	.9104E+06
.61	.5882E-02	2.008913	.9061E+06
.62	.5881E-02	1.997671	.9019E+06
.63	.5882E-02	1.986554	.8977E+06
.64	.5882E-02	1.975561	.8936E+06
.65	.5882E-02	1.964688	.8895E+06
.66	.5882E-02	1.953934	.8854E+06
.67	.5882E-02	1.943298	.8813E+06
.68	.5882E-02	1.932776	.8772E+06
.69	.5882E-02	1.922368	.8731E+06
.70	.5882E-02	1.912072	.8691E+06
.71	.5882E-02	1.901885	.8651E+06
.72	.5882E-02	1.891806	.8611E+06
.73	.5883E-02	1.881833	.8572E+06
.74	.5883E-02	1.871965	.8533E+06
.75	.5882E-02	1.862200	.8494E+06
.76	.5882E-02	1.852537	.8456E+06
.77	.5882E-02	1.842973	.8418E+06
.78	.5883E-02	1.833507	.8381E+06
.79	.5882E-02	1.824138	.8344E+06
.80	.5882E-02	1.814864	.8307E+06
.81	.5883E-02	1.805685	.8271E+06
.82	.5883E-02	1.796597	.8234E+06
.83	.5883E-02	1.787601	.8199E+06
.84	.5884E-02	1.778694	.8163E+06
.85	.5883E-02	1.769875	.8128E+06
.86	.5883E-02	1.761144	.8093E+06
.87	.5883E-02	1.752498	.8058E+06
.88	.5883E-02	1.743937	.8024E+06
.89	.5883E-02	1.735459	.7990E+06
.90	.5884E-02	1.727063	.7956E+06
.91	.5883E-02	1.718747	.7922E+06
.92	.5883E-02	1.710512	.7889E+06
.93	.5883E-02	1.702355	.7856E+06
.94	.5883E-02	1.694276	.7823E+06
.95	.5884E-02	1.686272	.7791E+06
.96	.5884E-02	1.678344	.7759E+06
.97	.5884E-02	1.670491	.7727E+06
.98	.5884E-02	1.662710	.7695E+06
.99	.5884E-02	1.655002	.7664E+06
1.00	.5883E-02	1.647364	.7633E+06

VREME (1.E-6)	POJACANJE (1/cm)	KONC. ELEKTRONA (1.E+12 1/cm ³)	IZL. SNAGA (W)
1.01	.5884E-02	1.639797	.7602E+06
1.02	.5883E-02	1.632299	.7571E+06
1.03	.5884E-02	1.624870	.7540E+06
1.04	.5884E-02	1.617507	.7510E+06
1.05	.5884E-02	1.610211	.7480E+06
1.06	.5884E-02	1.602981	.7450E+06
1.07	.5884E-02	1.595815	.7421E+06
1.08	.5884E-02	1.588713	.7391E+06
1.09	.5884E-02	1.581674	.7362E+06
1.10	.5884E-02	1.574697	.7333E+06
1.11	.5885E-02	1.567782	.7305E+06
1.12	.5885E-02	1.560926	.7276E+06
1.13	.5884E-02	1.554131	.7248E+06
1.14	.5885E-02	1.547395	.7220E+06
1.15	.5884E-02	1.540716	.7192E+06
1.16	.5884E-02	1.534095	.7164E+06
1.17	.5885E-02	1.527531	.7136E+06
1.18	.5884E-02	1.521022	.7109E+06
1.19	.5885E-02	1.514569	.7082E+06
1.20	.5885E-02	1.508170	.7055E+06
1.21	.5884E-02	1.501825	.7028E+06
1.22	.5885E-02	1.495534	.7002E+06
1.23	.5885E-02	1.489295	.6975E+06
1.24	.5885E-02	1.483107	.6949E+06
1.25	.5885E-02	1.476971	.6923E+06
1.26	.5885E-02	1.470886	.6897E+06
1.27	.5885E-02	1.464850	.6872E+06
1.28	.5885E-02	1.458864	.6846E+06
1.29	.5884E-02	1.452926	.6821E+06
1.30	.5885E-02	1.447037	.6796E+06
1.31	.5885E-02	1.441195	.6771E+06
1.32	.5885E-02	1.435400	.6746E+06
1.33	.5885E-02	1.429651	.6721E+06
1.34	.5885E-02	1.423949	.6697E+06
1.35	.5885E-02	1.418291	.6672E+06
1.36	.5886E-02	1.412679	.6648E+06
1.37	.5886E-02	1.407110	.6624E+06
1.38	.5885E-02	1.401586	.6600E+06
1.39	.5886E-02	1.396105	.6576E+06
1.40	.5886E-02	1.390666	.6553E+06
1.41	.5886E-02	1.385269	.6529E+06
1.42	.5885E-02	1.379915	.6506E+06
1.43	.5885E-02	1.374601	.6483E+06
1.44	.5885E-02	1.369329	.6460E+06
1.45	.5886E-02	1.364096	.6437E+06
1.46	.5886E-02	1.358904	.6415E+06
1.47	.5886E-02	1.353750	.6392E+06
1.48	.5886E-02	1.348636	.6370E+06
1.49	.5885E-02	1.343560	.6347E+06
1.50	.5886E-02	1.338522	.6325E+06

VREME (1.E-6)	POJACANJE (1/cm)	KONC. ELEKTRONA (1.E+12 1/cm ³)	IZL. SNAGA (W)
1.51	.5886E-02	1.333522	.6303E+06
1.52	.5886E-02	1.328560	.6281E+06
1.53	.5885E-02	1.323633	.6260E+06
1.54	.5886E-02	1.318744	.6238E+06
1.55	.5886E-02	1.313890	.6217E+06
1.56	.5886E-02	1.309072	.6195E+06
1.57	.5886E-02	1.304289	.6174E+06
1.58	.5886E-02	1.299541	.6153E+06
1.59	.5887E-02	1.294828	.6132E+06
1.60	.5886E-02	1.290148	.6111E+06
1.61	.5886E-02	1.285502	.6090E+06
1.62	.5886E-02	1.280890	.6070E+06
1.63	.5886E-02	1.276310	.6049E+06
1.64	.5886E-02	1.271763	.6029E+06
1.65	.5886E-02	1.267249	.6009E+06
1.66	.5886E-02	1.262766	.5989E+06
1.67	.5886E-02	1.258315	.5969E+06
1.68	.5886E-02	1.253895	.5949E+06
1.69	.5886E-02	1.249506	.5929E+06
1.70	.5886E-02	1.245148	.5910E+06
1.71	.5886E-02	1.240820	.5890E+06
1.72	.5886E-02	1.236522	.5871E+06
1.73	.5887E-02	1.232254	.5851E+06
1.74	.5887E-02	1.228015	.5832E+06
1.75	.5886E-02	1.223805	.5813E+06
1.76	.5886E-02	1.219624	.5794E+06
1.77	.5887E-02	1.215472	.5775E+06
1.78	.5887E-02	1.211347	.5757E+06
1.79	.5886E-02	1.207251	.5738E+06
1.80	.5887E-02	1.203182	.5719E+06
1.81	.5887E-02	1.199140	.5701E+06
1.82	.5887E-02	1.195125	.5683E+06
1.83	.5887E-02	1.191138	.5664E+06
1.84	.5887E-02	1.187176	.5646E+06
1.85	.5887E-02	1.183242	.5628E+06
1.86	.5887E-02	1.179333	.5610E+06
1.87	.5886E-02	1.175449	.5593E+06
1.88	.5887E-02	1.171592	.5575E+06
1.89	.5887E-02	1.167759	.5557E+06
1.90	.5887E-02	1.163952	.5540E+06
1.91	.5887E-02	1.160169	.5522E+06
1.92	.5887E-02	1.156411	.5505E+06
1.93	.5887E-02	1.152677	.5488E+06
1.94	.5887E-02	1.148967	.5471E+06
1.95	.5887E-02	1.145281	.5454E+06
1.96	.5887E-02	1.141618	.5437E+06
1.97	.5887E-02	1.137979	.5420E+06
1.98	.5887E-02	1.134363	.5403E+06
1.99	.5887E-02	1.130770	.5386E+06
2.00	.5887E-02	1.127199	.5370E+06

VREME (1.E-6)	POJACANJE (1/cm)	KONC. ELEKTRONA (1.E+12 1/cm ³)	IZL. SNAGA (W)
2.01	.5887E-02	1.123651	.5353E+06
2.02	.5887E-02	1.120126	.5337E+06
2.03	.5887E-02	1.116622	.5320E+06
2.04	.5887E-02	1.113140	.5304E+06
2.05	.5886E-02	1.109680	.5288E+06
2.06	.5887E-02	1.106241	.5272E+06
2.07	.5888E-02	1.102824	.5256E+06
2.08	.5888E-02	1.099427	.5240E+06
2.09	.5887E-02	1.096052	.5224E+06
2.10	.5887E-02	1.092697	.5209E+06
2.11	.5888E-02	1.089362	.5193E+06
2.12	.5888E-02	1.086048	.5177E+06
2.13	.5887E-02	1.082754	.5162E+06
2.14	.5887E-02	1.079480	.5147E+06
2.15	.5888E-02	1.076226	.5131E+06
2.16	.5887E-02	1.072991	.5116E+06
2.17	.5887E-02	1.069775	.5101E+06
2.18	.5888E-02	1.066579	.5086E+06
2.19	.5887E-02	1.063402	.5071E+06
2.20	.5888E-02	1.060244	.5056E+06
2.21	.5888E-02	1.057104	.5041E+06
2.22	.5888E-02	1.053983	.5026E+06
2.23	.5888E-02	1.050880	.5012E+06
2.24	.5887E-02	1.047796	.4997E+06
2.25	.5888E-02	1.044729	.4982E+06
2.26	.5887E-02	1.041681	.4968E+06
2.27	.5888E-02	1.038650	.4953E+06
2.28	.5888E-02	1.035637	.4939E+06
2.29	.5887E-02	1.032641	.4925E+06
2.30	.5888E-02	1.029663	.4911E+06
2.31	.5888E-02	1.026701	.4897E+06
2.32	.5887E-02	1.023757	.4883E+06
2.33	.5888E-02	1.020829	.4869E+06
2.34	.5888E-02	1.017919	.4855E+06
2.35	.5888E-02	1.015024	.4841E+06
2.36	.5888E-02	1.012146	.4827E+06
2.37	.5888E-02	1.009285	.4814E+06
2.38	.5888E-02	1.006439	.4800E+06
2.39	.5887E-02	1.003610	.4786E+06
2.40	.5888E-02	1.000796	.4773E+06
2.41	.5887E-02	.997998	.4759E+06
2.42	.5888E-02	.995216	.4746E+06
2.43	.5888E-02	.992449	.4733E+06
2.44	.5888E-02	.989698	.4720E+06
2.45	.5888E-02	.986962	.4706E+06
2.46	.5888E-02	.984241	.4693E+06
2.47	.5888E-02	.981534	.4680E+06
2.48	.5889E-02	.978843	.4668E+06
2.49	.5889E-02	.976166	.4657E+06
2.50	.5889E-02	.973504	.4646E+06

VREME (1.E-6)	POJACANJE (1/cm)	KONC. ELEKTRONA (1.E+12 1/cm ³)	IZL. SNAGA (W)
2.51	.5889E-02	.970857	.4634E+06
2.52	.5889E-02	.968224	.4623E+06
2.53	.5889E-02	.965605	.4612E+06
2.54	.5889E-02	.963000	.4600E+06
2.55	.5889E-02	.960409	.4589E+06
2.56	.5889E-02	.957832	.4578E+06
2.57	.5889E-02	.955269	.4567E+06
2.58	.5889E-02	.952720	.4556E+06
2.59	.5889E-02	.950184	.4545E+06
2.60	.5889E-02	.947661	.4534E+06
2.61	.5889E-02	.945152	.4523E+06
2.62	.5890E-02	.942657	.4512E+06
2.63	.5890E-02	.940174	.4501E+06
2.64	.5889E-02	.937704	.4490E+06
2.65	.5889E-02	.935248	.4479E+06
2.66	.5889E-02	.932804	.4469E+06
2.67	.5890E-02	.930373	.4458E+06
2.68	.5889E-02	.927954	.4447E+06
2.69	.5889E-02	.925549	.4437E+06
2.70	.5889E-02	.923155	.4426E+06
2.71	.5890E-02	.920774	.4416E+06
2.72	.5889E-02	.918405	.4405E+06
2.73	.5889E-02	.916048	.4395E+06
2.74	.5889E-02	.913704	.4384E+06
2.75	.5889E-02	.911371	.4374E+06
2.76	.5890E-02	.909050	.4363E+06
2.77	.5889E-02	.906741	.4353E+06
2.78	.5889E-02	.904444	.4343E+06
2.79	.5890E-02	.902158	.4333E+06
2.80	.5889E-02	.899884	.4323E+06
2.81	.5890E-02	.897622	.4312E+06
2.82	.5889E-02	.895370	.4302E+06
2.83	.5890E-02	.893130	.4292E+06
2.84	.5889E-02	.890901	.4282E+06
2.85	.5890E-02	.888683	.4272E+06
2.86	.5890E-02	.886476	.4262E+06
2.87	.5890E-02	.884281	.4253E+06
2.88	.5890E-02	.882096	.4243E+06
2.89	.5890E-02	.879921	.4233E+06
2.90	.5890E-02	.877758	.4223E+06
2.91	.5890E-02	.875605	.4213E+06
2.92	.5890E-02	.873462	.4204E+06
2.93	.5890E-02	.871330	.4194E+06
2.94	.5890E-02	.869209	.4184E+06
2.95	.5889E-02	.867098	.4175E+06
2.96	.5890E-02	.864997	.4165E+06
2.97	.5890E-02	.862906	.4156E+06
2.98	.5890E-02	.860825	.4146E+06
2.99	.5889E-02	.858754	.4137E+06
3.00	.5890E-02	.856693	.4127E+06

VREME (1.E-6)	POJACANJE (1/cm)	KONC. ELEKTRONA (1.E+12 1/cm ³)	IZL. SNAGA (W)
3.01	.5890E-02	.854642	.4118E+06
3.02	.5889E-02	.852601	.4109E+06
3.03	.5890E-02	.850570	.4099E+06
3.04	.5889E-02	.848548	.4090E+06
3.05	.5889E-02	.846536	.4081E+06
3.06	.5890E-02	.844533	.4072E+06
3.07	.5889E-02	.842540	.4063E+06
3.08	.5891E-02	.840556	.4054E+06
3.09	.5890E-02	.838581	.4044E+06
3.10	.5890E-02	.836616	.4035E+06
3.11	.5890E-02	.834660	.4026E+06
3.12	.5890E-02	.832713	.4017E+06
3.13	.5890E-02	.830775	.4008E+06
3.14	.5890E-02	.828846	.4000E+06
3.15	.5890E-02	.826926	.3991E+06
3.16	.5890E-02	.825015	.3982E+06
3.17	.5889E-02	.823113	.3973E+06
3.18	.5890E-02	.821219	.3964E+06
3.19	.5890E-02	.819335	.3956E+06
3.20	.5891E-02	.817458	.3947E+06
3.21	.5890E-02	.815591	.3938E+06
3.22	.5891E-02	.813732	.3930E+06
3.23	.5890E-02	.811881	.3921E+06
3.24	.5889E-02	.810039	.3912E+06
3.25	.5889E-02	.808205	.3904E+06
3.26	.5890E-02	.806379	.3895E+06
3.27	.5890E-02	.804562	.3887E+06
3.28	.5890E-02	.802753	.3878E+06
3.29	.5891E-02	.800951	.3870E+06
3.30	.5890E-02	.799159	.3862E+06
3.31	.5890E-02	.797373	.3853E+06
3.32	.5890E-02	.795596	.3845E+06
3.33	.5890E-02	.793827	.3837E+06
3.34	.5889E-02	.792066	.3828E+06
3.35	.5890E-02	.790312	.3820E+06
3.36	.5890E-02	.788567	.3812E+06
3.37	.5891E-02	.786829	.3804E+06
3.38	.5890E-02	.785098	.3796E+06
3.39	.5890E-02	.783375	.3788E+06
3.40	.5890E-02	.781660	.3780E+06
3.41	.5890E-02	.779952	.3772E+06
3.42	.5890E-02	.778252	.3764E+06
3.43	.5891E-02	.776559	.3756E+06
3.44	.5890E-02	.774873	.3748E+06
3.45	.5890E-02	.773195	.3740E+06
3.46	.5890E-02	.771524	.3732E+06
3.47	.5890E-02	.769860	.3724E+06
3.48	.5890E-02	.768203	.3716E+06
3.49	.5890E-02	.766554	.3708E+06
3.50	.5890E-02	.764911	.3701E+06

VREME (1.E-6)	POJACANJE (1/cm)	KONC. ELEKTRONA (1.E+12 1/cm ³)	IZL. SNAGA (W)
3.51	.5890E-02	.763276	.3693E+06
3.52	.5891E-02	.761647	.3685E+06
3.53	.5890E-02	.760026	.3677E+06
3.54	.5890E-02	.758411	.3670E+06
3.55	.5890E-02	.756803	.3662E+06
3.56	.5891E-02	.755202	.3655E+06
3.57	.5891E-02	.753608	.3647E+06
3.58	.5890E-02	.752020	.3639E+06
3.59	.5891E-02	.750440	.3632E+06
3.60	.5890E-02	.748865	.3624E+06
3.61	.5890E-02	.747298	.3617E+06
3.62	.5891E-02	.745737	.3610E+06
3.63	.5890E-02	.744182	.3602E+06
3.64	.5891E-02	.742634	.3595E+06
3.65	.5891E-02	.741092	.3587E+06
3.66	.5890E-02	.739557	.3580E+06
3.67	.5890E-02	.738028	.3573E+06
3.68	.5891E-02	.736505	.3566E+06
3.69	.5891E-02	.734989	.3558E+06
3.70	.5890E-02	.733479	.3551E+06
3.71	.5891E-02	.731975	.3544E+06
3.72	.5891E-02	.730477	.3537E+06
3.73	.5891E-02	.728985	.3530E+06
3.74	.5891E-02	.727500	.3523E+06
3.75	.5891E-02	.726020	.3516E+06
3.76	.5891E-02	.724547	.3508E+06
3.77	.5890E-02	.723079	.3501E+06
3.78	.5891E-02	.721617	.3494E+06
3.79	.5890E-02	.720162	.3487E+06
3.80	.5890E-02	.718712	.3480E+06
3.81	.5891E-02	.717268	.3474E+06
3.82	.5890E-02	.715829	.3467E+06
3.83	.5891E-02	.714397	.3460E+06
3.84	.5890E-02	.712970	.3453E+06
3.85	.5890E-02	.711549	.3446E+06
3.86	.5891E-02	.710134	.3439E+06
3.87	.5891E-02	.708724	.3433E+06
3.88	.5890E-02	.707319	.3426E+06
3.89	.5891E-02	.705921	.3419E+06
3.90	.5891E-02	.704528	.3412E+06
3.91	.5890E-02	.703140	.3406E+06
3.92	.5891E-02	.701758	.3399E+06
3.93	.5891E-02	.700381	.3392E+06
3.94	.5890E-02	.699009	.3386E+06
3.95	.5891E-02	.697643	.3379E+06
3.96	.5891E-02	.696283	.3373E+06
3.97	.5891E-02	.694927	.3366E+06
3.98	.5891E-02	.693577	.3360E+06
3.99	.5891E-02	.692232	.3353E+06
4.00	.5891E-02	.690892	.3347E+06

VREME (1.E-6)	POJACANJE (1/cm)	KONC. ELEKTRONA (1.E+12 1/cm ³)	IZL. SNAGA (W)
4.01	.5891E-02	.689558	.3340E+06
4.02	.5891E-02	.688229	.3334E+06
4.03	.5891E-02	.686904	.3327E+06
4.04	.5891E-02	.685585	.3321E+06
4.05	.5891E-02	.684271	.3315E+06
4.06	.5891E-02	.682962	.3308E+06
4.07	.5891E-02	.681658	.3302E+06
4.08	.5891E-02	.680359	.3296E+06
4.09	.5891E-02	.679064	.3290E+06
4.10	.5891E-02	.677775	.3283E+06
4.11	.5891E-02	.676491	.3277E+06
4.12	.5891E-02	.675211	.3271E+06
4.13	.5891E-02	.673936	.3265E+06
4.14	.5891E-02	.672667	.3259E+06
4.15	.5891E-02	.671401	.3252E+06
4.16	.5891E-02	.670141	.3246E+06
4.17	.5892E-02	.668885	.3240E+06
4.18	.5891E-02	.667634	.3234E+06
4.19	.5891E-02	.666388	.3228E+06
4.20	.5891E-02	.665147	.3222E+06
4.21	.5891E-02	.663909	.3216E+06
4.22	.5891E-02	.662677	.3210E+06
4.23	.5891E-02	.661449	.3204E+06
4.24	.5891E-02	.660226	.3198E+06
4.25	.5891E-02	.659007	.3192E+06
4.26	.5890E-02	.657793	.3186E+06
4.27	.5891E-02	.656583	.3181E+06
4.28	.5891E-02	.655378	.3175E+06
4.29	.5891E-02	.654177	.3169E+06
4.30	.5892E-02	.652980	.3163E+06
4.31	.5891E-02	.651788	.3157E+06
4.32	.5892E-02	.650600	.3151E+06
4.33	.5891E-02	.649416	.3146E+06
4.34	.5892E-02	.648237	.3140E+06
4.35	.5891E-02	.647062	.3134E+06
4.36	.5892E-02	.645891	.3129E+06
4.37	.5892E-02	.644725	.3123E+06
4.38	.5890E-02	.643563	.3117E+06
4.39	.5891E-02	.642404	.3112E+06
4.40	.5891E-02	.641250	.3106E+06
4.41	.5892E-02	.640101	.3100E+06
4.42	.5891E-02	.638955	.3095E+06
4.43	.5891E-02	.637813	.3089E+06
4.44	.5892E-02	.636676	.3084E+06
4.45	.5891E-02	.635542	.3078E+06
4.46	.5892E-02	.634413	.3073E+06
4.47	.5892E-02	.633287	.3067E+06
4.48	.5891E-02	.632166	.3062E+06
4.49	.5891E-02	.631049	.3056E+06
4.50	.5891E-02	.629935	.3051E+06

VREME (1.E-6)	POJACANJE (1/cm)	KONC. ELEKTRONA (1.E+12 1/cm ³)	IZL. SNAGA (W)
4.51	.5892E-02	.628825	.3045E+06
4.52	.5891E-02	.627720	.3040E+06
4.53	.5891E-02	.626618	.3035E+06
4.54	.5892E-02	.625520	.3029E+06
4.55	.5891E-02	.624426	.3024E+06
4.56	.5892E-02	.623335	.3019E+06
4.57	.5891E-02	.622249	.3013E+06
4.58	.5891E-02	.621166	.3008E+06
4.59	.5891E-02	.620087	.3003E+06
4.60	.5891E-02	.619012	.2997E+06
4.61	.5891E-02	.617940	.2992E+06
4.62	.5892E-02	.616873	.2987E+06
4.63	.5892E-02	.615808	.2982E+06
4.64	.5892E-02	.614748	.2977E+06
4.65	.5892E-02	.613691	.2972E+06
4.66	.5891E-02	.612638	.2966E+06
4.67	.5892E-02	.611588	.2961E+06
4.68	.5892E-02	.610542	.2956E+06
4.69	.5892E-02	.609500	.2951E+06
4.70	.5892E-02	.608461	.2946E+06
4.71	.5892E-02	.607426	.2941E+06
4.72	.5892E-02	.606394	.2936E+06
4.73	.5892E-02	.605366	.2931E+06
4.74	.5892E-02	.604341	.2926E+06
4.75	.5892E-02	.603320	.2921E+06
4.76	.5892E-02	.602302	.2916E+06
4.77	.5892E-02	.601287	.2911E+06
4.78	.5892E-02	.600276	.2906E+06
4.79	.5892E-02	.599268	.2901E+06
4.80	.5892E-02	.598264	.2896E+06
4.81	.5892E-02	.597263	.2891E+06
4.82	.5892E-02	.596266	.2886E+06
4.83	.5892E-02	.595271	.2881E+06
4.84	.5892E-02	.594280	.2877E+06
4.85	.5891E-02	.593293	.2872E+06
4.86	.5892E-02	.592308	.2867E+06
4.87	.5892E-02	.591327	.2862E+06
4.88	.5891E-02	.590349	.2857E+06
4.89	.5892E-02	.589375	.2853E+06
4.90	.5891E-02	.588403	.2848E+06
4.91	.5891E-02	.587435	.2843E+06
4.92	.5892E-02	.586470	.2838E+06
4.93	.5892E-02	.585508	.2834E+06
4.94	.5892E-02	.584549	.2829E+06
4.95	.5891E-02	.583594	.2824E+06
4.96	.5892E-02	.582641	.2820E+06
4.97	.5891E-02	.581692	.2815E+06
4.98	.5891E-02	.580745	.2810E+06
4.99	.5892E-02	.579802	.2806E+06
5.00	.5891E-02	.578862	.2801E+06

VREME (1.E-6)	POJACANJE (1/cm)	KONC. ELEKTRONA (1.E+12 1/cm ³)	IZL. SNAGA (W)
5.01	.5892E-02	.577925	.2796E+06
5.02	.5892E-02	.576991	.2792E+06
5.03	.5892E-02	.576060	.2787E+06
5.04	.5892E-02	.575132	.2783E+06
5.05	.5892E-02	.574206	.2778E+06
5.06	.5892E-02	.573284	.2774E+06
5.07	.5892E-02	.572365	.2769E+06
5.08	.5891E-02	.571449	.2765E+06
5.09	.5892E-02	.570536	.2760E+06
5.10	.5892E-02	.569625	.2756E+06
5.11	.5892E-02	.568718	.2751E+06
5.12	.5891E-02	.567813	.2747E+06
5.13	.5892E-02	.566912	.2743E+06
5.14	.5892E-02	.566013	.2738E+06
5.15	.5892E-02	.565117	.2734E+06
5.16	.5892E-02	.564223	.2729E+06
5.17	.5892E-02	.563333	.2725E+06
5.18	.5892E-02	.562445	.2721E+06
5.19	.5891E-02	.561561	.2716E+06
5.20	.5892E-02	.560679	.2712E+06
5.21	.5892E-02	.559800	.2708E+06
5.22	.5891E-02	.558923	.2703E+06
5.23	.5892E-02	.558049	.2699E+06
5.24	.5891E-02	.557178	.2695E+06
5.25	.5892E-02	.556310	.2691E+06
5.26	.5892E-02	.555444	.2686E+06
5.27	.5892E-02	.554582	.2682E+06
5.28	.5891E-02	.553721	.2678E+06
5.29	.5892E-02	.552864	.2674E+06
5.30	.5892E-02	.552009	.2669E+06
5.31	.5893E-02	.551157	.2665E+06
5.32	.5892E-02	.550307	.2661E+06
5.33	.5892E-02	.549460	.2657E+06
5.34	.5892E-02	.548616	.2653E+06
5.35	.5891E-02	.547774	.2649E+06
5.36	.5892E-02	.546935	.2645E+06
5.37	.5892E-02	.546098	.2640E+06
5.38	.5893E-02	.545264	.2636E+06
5.39	.5892E-02	.544432	.2632E+06
5.40	.5892E-02	.543603	.2628E+06
5.41	.5892E-02	.542777	.2624E+06
5.42	.5892E-02	.541953	.2620E+06
5.43	.5892E-02	.541131	.2616E+06
5.44	.5892E-02	.540312	.2612E+06
5.45	.5893E-02	.539495	.2608E+06
5.46	.5892E-02	.538681	.2604E+06
5.47	.5892E-02	.537870	.2600E+06
5.48	.5892E-02	.537061	.2596E+06
5.49	.5892E-02	.536254	.2592E+06
5.50	.5892E-02	.535450	.2588E+06

VREME (1.E-6)	POJACANJE (1/cm)	KONC. ELEKTRONA (1.E+12 1/cm ³)	IZL. SNAGA (W)
5.51	.5892E-02	.534648	.2584E+06
5.52	.5892E-02	.533848	.2580E+06
5.53	.5893E-02	.533051	.2576E+06
5.54	.5893E-02	.532256	.2573E+06
5.55	.5892E-02	.531464	.2569E+06
5.56	.5893E-02	.530674	.2565E+06
5.57	.5893E-02	.529886	.2561E+06
5.58	.5892E-02	.529101	.2557E+06
5.59	.5893E-02	.528318	.2553E+06
5.60	.5892E-02	.527537	.2549E+06
5.61	.5892E-02	.526758	.2546E+06
5.62	.5892E-02	.525982	.2542E+06
5.63	.5892E-02	.525208	.2538E+06
5.64	.5893E-02	.524437	.2534E+06
5.65	.5892E-02	.523668	.2530E+06
5.66	.5893E-02	.522901	.2527E+06
5.67	.5892E-02	.522136	.2523E+06
5.68	.5893E-02	.521373	.2519E+06
5.69	.5893E-02	.520613	.2515E+06
5.70	.5892E-02	.519855	.2512E+06
5.71	.5892E-02	.519099	.2508E+06
5.72	.5892E-02	.518345	.2504E+06
5.73	.5892E-02	.517593	.2501E+06
5.74	.5893E-02	.516844	.2497E+06
5.75	.5892E-02	.516097	.2493E+06
5.76	.5892E-02	.515352	.2490E+06
5.77	.5893E-02	.514609	.2486E+06
5.78	.5893E-02	.513868	.2482E+06
5.79	.5892E-02	.513129	.2479E+06
5.80	.5892E-02	.512393	.2475E+06
5.81	.5892E-02	.511659	.2472E+06
5.82	.5892E-02	.510926	.2468E+06
5.83	.5892E-02	.510196	.2464E+06
5.84	.5892E-02	.509468	.2461E+06
5.85	.5892E-02	.508742	.2457E+06
5.86	.5892E-02	.508018	.2454E+06
5.87	.5892E-02	.507296	.2450E+06
5.88	.5892E-02	.506576	.2447E+06
5.89	.5892E-02	.505858	.2443E+06
5.90	.5892E-02	.505142	.2440E+06
5.91	.5892E-02	.504429	.2436E+06
5.92	.5892E-02	.503717	.2433E+06
5.93	.5892E-02	.503007	.2429E+06
5.94	.5893E-02	.502299	.2426E+06
5.95	.5892E-02	.501594	.2422E+06
5.96	.5893E-02	.500890	.2419E+06
5.97	.5892E-02	.500188	.2415E+06
5.98	.5893E-02	.499488	.2412E+06
5.99	.5893E-02	.498790	.2408E+06
6.00	.5893E-02	.498094	.2405E+06

PRILOG B:

"LISTING" REZULTATA PRORAČUNA

LASERA SA SAMOSTALNIM PRAŽNJENJEM

VREME	T1	T2	T3	T4	T5	T
(1.E-6)	(K)	(K)	(K)	(K)	(K)	(K)
.00	300.00	300.00	300.00	300.00	300.00	300.00
.01	309.52	299.30	323.62	356.44	348.39	300.00
.02	309.65	299.38	356.84	410.21	406.45	300.00
.03	309.79	299.51	385.25	452.63	455.53	300.00
.04	309.98	299.69	409.64	488.80	498.84	300.00
.05	310.20	299.90	431.18	521.03	538.36	300.00
.06	310.47	300.15	450.63	550.53	575.20	300.00
.07	310.77	300.44	468.47	578.00	610.08	300.00
.08	311.10	300.76	485.04	603.88	643.44	300.00
.09	311.46	301.11	500.57	628.50	675.62	300.00
.10	311.85	301.48	515.23	652.06	706.84	300.00
.11	312.27	301.88	529.15	674.74	737.28	300.00
.12	312.87	302.42	533.14	696.64	767.06	300.00
.13	315.73	303.75	530.62	717.87	796.24	300.00
.14	316.68	304.77	532.20	738.51	824.94	300.00
.15	317.77	305.79	534.02	758.61	853.25	300.00
.16	318.89	306.85	535.87	778.23	881.21	300.00
.17	320.03	307.93	537.74	797.40	908.87	300.00
.18	321.18	309.03	539.64	816.17	936.25	300.02
.19	322.34	310.14	541.56	834.55	963.37	300.05
.20	323.50	311.27	543.49	852.58	990.28	300.08
.21	324.68	312.40	545.44	870.28	1016.98	300.12
.22	325.86	313.55	547.39	887.66	1043.50	300.15
.23	327.04	314.70	549.34	904.75	1069.85	300.18
.24	328.22	315.85	551.29	921.55	1096.05	300.21
.25	329.40	317.00	553.24	938.07	1122.10	300.24
.26	330.57	318.15	555.18	954.34	1148.02	300.27
.27	331.74	319.30	557.11	970.35	1173.81	300.30
.28	332.90	320.44	559.02	986.12	1199.47	300.33
.29	334.05	321.57	560.93	1001.66	1225.02	300.36
.30	335.19	322.70	562.82	1016.97	1250.45	300.39
.31	336.32	323.82	564.69	1032.05	1275.77	300.42
.32	337.44	324.92	566.54	1046.92	1300.98	300.47
.33	338.55	326.02	568.37	1061.58	1326.05	300.53
.34	339.64	327.10	570.17	1076.03	1351.00	300.59
.35	340.72	328.17	571.96	1090.28	1375.85	300.66
.36	341.78	329.22	573.72	1104.33	1400.58	300.72
.37	342.83	330.26	575.45	1118.19	1425.21	300.78
.38	343.86	331.29	577.15	1131.86	1449.72	300.84
.39	344.88	332.29	578.83	1145.34	1474.13	300.90
.40	345.87	333.28	580.48	1158.63	1498.43	300.96
.41	346.85	334.26	582.10	1171.75	1522.62	301.02
.42	347.81	335.21	583.69	1184.68	1546.70	301.08
.43	348.76	336.15	585.25	1197.44	1570.66	301.14
.44	349.68	337.07	586.77	1210.03	1594.52	301.20
.45	350.59	337.97	588.27	1222.44	1618.25	301.27
.46	351.47	338.85	589.74	1234.69	1641.87	301.33
.47	352.34	339.71	591.17	1246.76	1665.37	301.40
.48	353.18	340.55	592.57	1258.68	1688.71	301.49
.49	354.01	341.38	593.94	1270.43	1711.90	301.58
.50	354.82	342.18	595.28	1282.02	1734.95	301.68

VREME (1.E-6)	T1 (K)	T2 (K)	T3 (K)	T4 (K)	T5 (K)	T (K)
.51	355.61	342.97	596.58	1293.45	1757.86	301.77
.52	356.38	343.74	597.85	1304.72	1780.64	301.86
.53	357.13	344.48	599.09	1315.83	1803.29	301.95
.54	357.86	345.21	600.30	1326.80	1825.79	302.04
.55	358.57	345.92	601.48	1337.61	1848.16	302.13
.56	359.26	346.61	602.62	1348.27	1870.39	302.22
.57	359.93	347.28	603.73	1358.78	1892.47	302.32
.58	360.59	347.93	604.81	1369.14	1914.40	302.41
.59	361.22	348.56	605.86	1379.36	1936.19	302.50
.60	361.83	349.18	606.88	1389.44	1957.83	302.59
.61	362.43	349.77	607.86	1399.37	1979.32	302.68
.62	363.01	350.35	608.82	1409.16	2000.65	302.77
.63	363.56	350.91	609.74	1418.81	2021.83	302.87
.64	364.10	351.45	610.64	1428.33	2042.85	302.96
.65	364.63	351.97	611.50	1437.70	2063.71	303.05
.66	365.13	352.47	612.33	1446.95	2084.40	303.14
.67	365.61	352.96	613.14	1456.05	2104.94	303.23
.68	366.08	353.42	613.91	1465.03	2125.31	303.32
.69	366.53	353.88	614.66	1473.88	2145.52	303.41
.70	366.97	354.31	615.38	1482.60	2165.55	303.52
.71	367.38	354.73	616.07	1491.19	2185.34	303.64
.72	367.78	355.13	616.73	1499.65	2204.93	303.77
.73	368.16	355.51	617.36	1507.99	2224.33	303.89
.74	368.53	355.88	617.97	1516.20	2243.54	304.01
.75	368.88	356.23	618.55	1524.30	2262.57	304.13
.76	369.21	356.57	619.11	1532.27	2281.42	304.25
.77	369.53	356.89	619.64	1540.13	2300.09	304.38
.78	369.84	357.20	620.15	1547.86	2318.57	304.50
.79	370.13	357.49	620.63	1555.48	2336.87	304.62
.80	370.40	357.77	621.08	1562.99	2354.99	304.74
.81	370.66	358.03	621.51	1570.38	2372.92	304.86
.82	370.90	358.28	621.92	1577.66	2390.66	304.99
.83	371.14	358.51	622.31	1584.82	2408.22	305.11
.84	371.35	358.73	622.67	1591.88	2425.59	305.23
.85	371.56	358.94	623.01	1598.83	2442.78	305.35
.86	371.74	359.13	623.32	1605.68	2459.77	305.47
.87	371.92	359.31	623.62	1612.42	2476.58	305.60
.88	372.08	359.48	623.89	1619.05	2493.20	305.72
.89	372.24	359.63	624.14	1625.58	2509.63	305.84
.90	372.37	359.78	624.37	1632.01	2525.87	305.96
.91	372.50	359.91	624.59	1638.34	2541.92	306.08
.92	372.61	360.03	624.78	1644.57	2557.79	306.21
.93	372.72	360.14	624.95	1650.70	2573.46	306.33
.94	372.81	360.23	625.10	1656.73	2588.95	306.45
.95	372.89	360.32	625.24	1662.67	2604.24	306.57
.96	372.95	360.39	625.36	1668.52	2619.35	306.70
.97	373.01	360.45	625.45	1674.27	2634.27	306.82
.98	373.06	360.51	625.54	1679.93	2649.00	306.94
.99	373.10	360.55	625.60	1685.50	2663.55	307.06
1.00	373.12	360.58	625.65	1690.99	2677.90	307.18

VREME	T1	T2	T3	T4	T5	T
(1.E-6)	(K)	(K)	(K)	(K)	(K)	(K)
1.01	373.14	360.60	625.68	1696.38	2692.07	307.31
1.02	373.15	360.62	625.69	1701.69	2706.05	307.43
1.03	373.14	360.62	625.69	1706.91	2719.85	307.55
1.04	373.13	360.62	625.68	1712.05	2733.46	307.67
1.05	373.11	360.60	625.65	1717.10	2746.89	307.79
1.06	373.08	360.58	625.60	1722.07	2760.13	307.92
1.07	373.04	360.55	625.54	1726.96	2773.19	308.04
1.08	373.00	360.51	625.47	1731.77	2786.07	308.16
1.09	372.94	360.46	625.38	1736.51	2798.76	308.28
1.10	372.88	360.41	625.28	1741.16	2811.28	308.40
1.11	372.81	360.34	625.17	1745.74	2823.62	308.53
1.12	372.73	360.27	625.04	1750.24	2835.77	308.65
1.13	372.64	360.20	624.90	1754.67	2847.76	308.77
1.14	372.55	360.11	624.76	1759.02	2859.56	308.89
1.15	372.45	360.02	624.59	1763.31	2871.19	309.01
1.16	372.35	359.92	624.42	1767.52	2882.64	309.14
1.17	372.23	359.82	624.24	1771.66	2893.92	309.26
1.18	372.11	359.71	624.05	1775.73	2905.03	309.38
1.19	371.99	359.59	623.84	1779.74	2915.97	309.50
1.20	371.86	359.47	623.63	1783.68	2926.74	309.62
1.21	371.72	359.34	623.41	1787.55	2937.34	309.75
1.22	371.58	359.20	623.17	1791.35	2947.78	309.87
1.23	371.43	359.06	622.93	1795.10	2958.04	309.99
1.24	371.27	358.92	622.68	1798.78	2968.15	310.11
1.25	371.11	358.77	622.42	1802.39	2978.09	310.24
1.26	370.95	358.61	622.15	1805.95	2987.87	310.36
1.27	370.78	358.45	621.88	1809.44	2997.49	310.48
1.28	370.61	358.29	621.60	1812.88	3006.95	310.60
1.29	370.43	358.12	621.31	1816.26	3016.26	310.72
1.30	370.25	357.95	621.01	1819.58	3025.41	310.85
1.31	370.06	357.77	620.70	1822.84	3034.40	310.97
1.32	369.87	357.59	620.39	1826.05	3043.29	311.06
1.33	369.68	357.40	620.07	1829.20	3052.12	311.16
1.34	369.48	357.21	619.75	1832.30	3060.86	311.25
1.35	369.28	357.02	619.42	1835.34	3069.48	311.34
1.36	369.07	356.83	619.08	1838.33	3077.96	311.43
1.37	368.86	356.63	618.74	1841.27	3086.32	311.52
1.38	368.65	356.42	618.39	1844.16	3094.53	311.61
1.39	368.43	356.22	618.04	1847.00	3102.61	311.71
1.40	368.21	356.01	617.68	1849.79	3110.55	311.80
1.41	367.99	355.80	617.31	1852.54	3118.36	311.89
1.42	367.77	355.58	616.94	1855.23	3126.03	311.98
1.43	367.54	355.36	616.57	1857.88	3133.56	312.07
1.44	367.31	355.14	616.19	1860.48	3140.97	312.16
1.45	367.08	354.92	615.81	1863.04	3148.24	312.25
1.46	366.84	354.70	615.43	1865.55	3155.39	312.35
1.47	366.61	354.47	615.04	1868.01	3162.40	312.44
1.48	366.37	354.24	614.65	1870.44	3169.29	312.53
1.49	366.13	354.01	614.25	1872.82	3176.06	312.62
1.50	365.88	353.78	613.85	1875.16	3182.70	312.71

VREME (1.E-6)	T1 (K)	T2 (K)	T3 (K)	T4 (K)	T5 (K)	T (K)
1.51	365.64	353.54	613.45	1877.46	3189.22	312.80
1.52	365.39	353.31	613.05	1879.71	3195.62	312.90
1.53	365.14	353.07	612.64	1881.93	3201.90	312.99
1.54	364.90	352.83	612.23	1884.11	3208.06	313.08
1.55	364.65	352.59	611.82	1886.25	3214.11	313.17
1.56	364.39	352.35	611.41	1888.35	3220.05	313.26
1.57	364.14	352.11	611.00	1890.42	3225.87	313.35
1.58	363.89	351.86	610.58	1892.45	3231.58	313.45
1.59	363.63	351.62	610.16	1894.44	3237.18	313.54
1.60	363.38	351.37	609.74	1896.39	3242.67	313.63
1.61	363.12	351.13	609.32	1898.32	3248.05	313.72
1.62	362.87	350.88	608.90	1900.20	3253.33	313.81
1.63	362.61	350.63	608.48	1902.06	3258.51	313.90
1.64	362.35	350.39	608.06	1903.88	3263.58	313.99
1.65	362.09	350.14	607.63	1905.66	3268.55	314.09
1.66	361.84	349.89	607.21	1907.42	3273.42	314.18
1.67	361.58	349.64	606.78	1909.14	3278.19	314.27
1.68	361.32	349.39	606.36	1910.84	3282.87	314.36
1.69	361.06	349.14	605.94	1912.50	3287.45	314.45
1.70	360.80	348.90	605.51	1914.13	3291.93	314.54
1.71	360.54	348.65	605.09	1915.74	3296.33	314.64
1.72	360.29	348.40	604.66	1917.31	3300.63	314.73
1.73	360.03	348.15	604.24	1918.86	3304.84	314.82
1.74	359.77	347.90	603.82	1920.38	3308.96	314.91
1.75	359.51	347.66	603.39	1921.87	3313.00	314.99
1.76	359.26	347.41	602.97	1923.33	3317.05	315.06
1.77	359.00	347.16	602.55	1924.77	3321.11	315.12
1.78	358.74	346.92	602.13	1926.18	3325.12	315.18
1.79	358.49	346.67	601.70	1927.56	3329.08	315.24
1.80	358.23	346.42	601.28	1928.92	3332.98	315.30
1.81	357.98	346.18	600.86	1930.26	3336.80	315.36
1.82	357.72	345.93	600.44	1931.57	3340.56	315.42
1.83	357.47	345.69	600.03	1932.86	3344.23	315.48
1.84	357.22	345.44	599.61	1934.12	3347.83	315.54
1.85	356.96	345.20	599.19	1935.36	3351.36	315.60
1.86	356.71	344.96	598.78	1936.58	3354.82	315.67
1.87	356.46	344.72	598.36	1937.77	3358.20	315.73
1.88	356.21	344.48	597.95	1938.95	3361.52	315.79
1.89	355.96	344.24	597.54	1940.10	3364.76	315.85
1.90	355.71	344.00	597.13	1941.23	3367.94	315.91
1.91	355.46	343.76	596.73	1942.34	3371.05	315.97
1.92	355.22	343.52	596.32	1943.43	3374.09	316.03
1.93	354.97	343.28	595.91	1944.50	3377.07	316.09
1.94	354.73	343.05	595.51	1945.55	3379.98	316.15
1.95	354.48	342.81	595.11	1946.58	3382.83	316.22
1.96	354.24	342.58	594.71	1947.59	3385.61	316.28
1.97	354.00	342.35	594.32	1948.58	3388.34	316.34
1.98	353.76	342.12	593.92	1949.56	3391.00	316.40
1.99	353.52	341.89	593.53	1950.52	3393.61	316.46
2.00	353.29	341.66	593.14	1951.45	3396.16	316.52

VREME (1.E-6)	T1 (K)	T2 (K)	T3 (K)	T4 (K)	T5 (K)	T (K)
2.01	353.05	341.43	592.75	1952.38	3398.65	316.58
2.02	352.82	341.21	592.36	1953.28	3401.08	316.64
2.03	352.58	340.98	591.98	1954.17	3403.46	316.70
2.04	352.35	340.76	591.60	1955.04	3405.78	316.76
2.05	352.12	340.54	591.22	1955.90	3408.05	316.83
2.06	351.89	340.32	590.85	1956.73	3410.27	316.89
2.07	351.67	340.10	590.47	1957.56	3412.44	316.95
2.08	351.44	339.88	590.10	1958.37	3414.55	317.01
2.09	351.22	339.67	589.73	1959.16	3416.61	317.07
2.10	351.00	339.45	589.37	1959.94	3418.63	317.13
2.11	350.78	339.24	589.00	1960.70	3420.59	317.19
2.12	350.56	339.03	588.64	1961.45	3422.51	317.25
2.13	350.34	338.82	588.28	1962.19	3424.39	317.31
2.14	350.12	338.61	587.93	1962.91	3426.21	317.37
2.15	349.91	338.41	587.58	1963.62	3427.99	317.44
2.16	349.70	338.20	587.23	1964.31	3429.73	317.50
2.17	349.49	338.00	586.88	1965.00	3431.42	317.56
2.18	349.28	337.80	586.54	1965.66	3433.07	317.62
2.19	349.07	337.60	586.20	1966.32	3434.68	317.68
2.20	348.87	337.40	585.86	1966.97	3436.24	317.74
2.21	348.66	337.21	585.52	1967.60	3437.77	317.80
2.22	348.46	337.01	585.19	1968.22	3439.35	317.83
2.23	348.26	336.82	584.86	1968.83	3440.99	317.86
2.24	348.06	336.63	584.53	1969.43	3442.64	317.89
2.25	347.87	336.44	584.21	1970.01	3444.28	317.92
2.26	347.67	336.25	583.88	1970.59	3445.90	317.95
2.27	347.47	336.06	583.56	1971.15	3447.50	317.98
2.28	347.28	335.88	583.25	1971.71	3449.06	318.01
2.29	347.09	335.69	582.93	1972.25	3450.59	318.04
2.30	346.90	335.51	582.62	1972.78	3452.09	318.07
2.31	346.71	335.33	582.31	1973.31	3453.56	318.10
2.32	346.53	335.15	582.00	1973.82	3454.99	318.13
2.33	346.34	334.97	581.69	1974.32	3456.39	318.16
2.34	346.16	334.79	581.39	1974.82	3457.76	318.19
2.35	345.98	334.62	581.09	1975.30	3459.10	318.23
2.36	345.80	334.44	580.79	1975.78	3460.41	318.26
2.37	345.62	334.27	580.50	1976.24	3461.69	318.29
2.38	345.44	334.10	580.20	1976.70	3462.93	318.32
2.39	345.26	333.93	579.91	1977.15	3464.15	318.35
2.40	345.09	333.76	579.63	1977.59	3465.34	318.38
2.41	344.92	333.60	579.34	1978.02	3466.50	318.41
2.42	344.75	333.43	579.06	1978.45	3467.63	318.44
2.43	344.58	333.27	578.78	1978.86	3468.74	318.47
2.44	344.41	333.11	578.51	1979.27	3469.82	318.50
2.45	344.24	332.95	578.23	1979.67	3470.87	318.53
2.46	344.08	332.79	577.96	1980.06	3471.90	318.56
2.47	343.92	332.63	577.69	1980.45	3472.90	318.59
2.48	343.76	332.48	577.43	1980.83	3473.87	318.62
2.49	343.60	332.32	577.16	1981.20	3474.83	318.65
2.50	343.44	332.17	576.90	1981.56	3475.75	318.68

VREME (1.E-6)	T1 (K)	T2 (K)	T3 (K)	T4 (K)	T5 (K)	T (K)
2.51	343.28	332.02	576.65	1981.92	3476.66	318.71
2.52	343.13	331.87	576.39	1982.27	3477.54	318.74
2.53	342.97	331.72	576.14	1982.61	3478.40	318.77
2.54	342.82	331.58	575.89	1982.95	3479.23	318.80
2.55	342.67	331.43	575.64	1983.28	3480.05	318.84
2.56	342.53	331.29	575.40	1983.60	3480.84	318.87
2.57	342.38	331.15	575.16	1983.92	3481.61	318.90
2.58	342.23	331.01	574.92	1984.23	3482.36	318.93
2.59	342.09	330.87	574.68	1984.54	3483.09	318.96
2.60	341.95	330.74	574.45	1984.84	3483.80	318.99
2.61	341.81	330.60	574.21	1985.13	3484.50	319.02
2.62	341.67	330.47	573.99	1985.42	3485.17	319.05
2.63	341.53	330.34	573.76	1985.70	3485.82	319.08
2.64	341.40	330.20	573.54	1985.98	3486.46	319.11
2.65	341.26	330.08	573.32	1986.25	3487.07	319.14
2.66	341.13	329.95	573.10	1986.52	3487.67	319.17
2.67	341.00	329.82	572.88	1986.78	3488.25	319.20
2.68	340.87	329.70	572.67	1987.04	3488.81	319.23
2.69	340.75	329.58	572.46	1987.29	3489.36	319.26
2.70	340.62	329.45	572.25	1987.54	3489.89	319.29
2.71	340.49	329.33	572.05	1987.78	3490.41	319.32
2.72	340.37	329.22	571.84	1988.02	3490.90	319.35
2.73	340.25	329.10	571.64	1988.25	3491.39	319.38
2.74	340.13	328.98	571.45	1988.48	3491.85	319.42
2.75	340.01	328.87	571.25	1988.70	3492.31	319.45
2.76	339.90	328.76	571.06	1988.92	3492.74	319.48
2.77	339.78	328.65	570.87	1989.14	3493.17	319.51
2.78	339.67	328.54	570.68	1989.35	3493.57	319.54
2.79	339.55	328.43	570.50	1989.56	3493.97	319.57
2.80	339.44	328.32	570.31	1989.76	3494.35	319.60
2.81	339.33	328.22	570.13	1989.96	3494.72	319.63
2.82	339.23	328.11	569.96	1990.15	3495.07	319.66
2.83	339.12	328.01	569.78	1990.35	3495.41	319.69
2.84	339.02	327.91	569.61	1990.53	3495.74	319.72
2.85	338.91	327.81	569.44	1990.72	3496.06	319.75
2.86	338.81	327.71	569.27	1990.90	3496.36	319.78
2.87	338.71	327.61	569.10	1991.08	3496.65	319.81
2.88	338.61	327.52	568.94	1991.25	3496.93	319.84
2.89	338.51	327.42	568.78	1991.42	3497.20	319.87
2.90	338.42	327.33	568.62	1991.59	3497.46	319.90
2.91	338.32	327.24	568.46	1991.75	3497.71	319.93
2.92	338.23	327.15	568.31	1991.91	3497.94	319.96
2.93	338.14	327.06	568.16	1992.07	3498.17	320.00
2.94	338.04	326.97	568.01	1992.23	3498.38	320.03
2.95	337.95	326.89	567.86	1992.38	3498.58	320.06
2.96	337.87	326.80	567.71	1992.53	3498.78	320.09
2.97	337.78	326.72	567.57	1992.67	3498.96	320.12
2.98	337.69	326.64	567.43	1992.82	3499.14	320.15
2.99	337.61	326.55	567.29	1992.96	3499.30	320.18
3.00	337.53	326.47	567.15	1993.09	3499.47	320.20

VREME	T1 (1.E-6)	T2 (K)	T3 (K)	T4 (K)	T5 (K)	T (K)
3.01	337.44	326.40	567.02	1993.23	3499.75	320.20
3.02	337.36	326.32	566.89	1993.36	3500.10	320.20
3.03	337.28	326.24	566.75	1993.49	3500.48	320.20
3.04	337.20	326.16	566.62	1993.62	3500.88	320.20
3.05	337.13	326.09	566.49	1993.74	3501.29	320.20
3.06	337.05	326.01	566.36	1993.87	3501.70	320.20
3.07	336.97	325.94	566.23	1993.99	3502.11	320.20
3.08	336.89	325.86	566.11	1994.10	3502.51	320.20
3.09	336.82	325.79	565.98	1994.22	3502.90	320.20
3.10	336.74	325.72	565.86	1994.33	3503.29	320.20
3.11	336.67	325.65	565.74	1994.44	3503.67	320.20
3.12	336.60	325.58	565.62	1994.55	3504.04	320.20
3.13	336.52	325.51	565.50	1994.66	3504.40	320.20
3.14	336.45	325.44	565.38	1994.76	3504.76	320.20
3.15	336.38	325.37	565.26	1994.86	3505.11	320.20
3.16	336.31	325.30	565.14	1994.96	3505.46	320.20
3.17	336.24	325.24	565.03	1995.06	3505.80	320.20
3.18	336.17	325.17	564.92	1995.16	3506.13	320.20
3.19	336.11	325.10	564.80	1995.25	3506.45	320.20
3.20	336.04	325.04	564.69	1995.35	3506.77	320.20
3.21	335.97	324.98	564.58	1995.44	3507.08	320.20
3.22	335.91	324.91	564.47	1995.53	3507.39	320.20
3.23	335.84	324.85	564.37	1995.61	3507.69	320.20
3.24	335.78	324.79	564.26	1995.70	3507.98	320.20
3.25	335.71	324.73	564.16	1995.78	3508.27	320.20
3.26	335.65	324.67	564.05	1995.87	3508.55	320.20
3.27	335.59	324.61	563.95	1995.95	3508.83	320.20
3.28	335.53	324.55	563.85	1996.03	3509.10	320.20
3.29	335.47	324.49	563.75	1996.10	3509.37	320.20
3.30	335.41	324.43	563.65	1996.18	3509.63	320.20
3.31	335.35	324.37	563.55	1996.26	3509.89	320.20
3.32	335.29	324.32	563.45	1996.33	3510.14	320.20
3.33	335.23	324.26	563.36	1996.40	3510.38	320.20
3.34	335.17	324.21	563.26	1996.47	3510.63	320.20
3.35	335.12	324.15	563.17	1996.54	3510.86	320.20
3.36	335.06	324.10	563.08	1996.61	3511.10	320.20
3.37	335.01	324.04	562.98	1996.67	3511.32	320.20
3.38	334.95	323.99	562.89	1996.74	3511.55	320.20
3.39	334.90	323.94	562.80	1996.80	3511.76	320.20
3.40	334.84	323.89	562.72	1996.86	3511.98	320.20
3.41	334.79	323.84	562.63	1996.93	3512.19	320.20
3.42	334.74	323.79	562.54	1996.99	3512.40	320.20
3.43	334.69	323.74	562.46	1997.04	3512.60	320.20
3.44	334.64	323.69	562.37	1997.10	3512.80	320.20
3.45	334.59	323.64	562.29	1997.16	3512.99	320.20
3.46	334.54	323.59	562.21	1997.21	3513.18	320.20
3.47	334.49	323.54	562.12	1997.27	3513.37	320.20
3.48	334.44	323.50	562.04	1997.32	3513.55	320.20
3.49	334.39	323.45	561.96	1997.37	3513.73	320.20
3.50	334.34	323.40	561.89	1997.43	3513.90	320.20

VREME (1.E-6)	T1 (K)	T2 (K)	T3 (K)	T4 (K)	T5 (K)	T (K)
3.51	334.30	323.36	561.81	1997.48	3514.08	320.20
3.52	334.25	323.31	561.73	1997.52	3514.25	320.20
3.53	334.20	323.27	561.66	1997.57	3514.41	320.20
3.54	334.16	323.23	561.58	1997.62	3514.57	320.20
3.55	334.12	323.18	561.51	1997.67	3514.73	320.20
3.56	334.07	323.14	561.43	1997.71	3514.89	320.20
3.57	334.03	323.10	561.36	1997.76	3515.04	320.20
3.58	333.98	323.06	561.29	1997.80	3515.19	320.20
3.59	333.94	323.01	561.22	1997.84	3515.34	320.20
3.60	333.90	322.97	561.15	1997.88	3515.48	320.20
3.61	333.86	322.93	561.08	1997.93	3515.62	320.20
3.62	333.82	322.89	561.02	1997.97	3515.76	320.20
3.63	333.78	322.86	560.95	1998.00	3515.90	320.20
3.64	333.74	322.82	560.88	1998.04	3516.03	320.20
3.65	333.70	322.78	560.82	1998.08	3516.16	320.20
3.66	333.66	322.74	560.75	1998.12	3516.29	320.20
3.67	333.62	322.70	560.69	1998.15	3516.41	320.20
3.68	333.58	322.67	560.63	1998.19	3516.53	320.20
3.69	333.54	322.63	560.56	1998.23	3516.65	320.20
3.70	333.51	322.60	560.50	1998.26	3516.77	320.20
3.71	333.47	322.56	560.44	1998.29	3516.89	320.20
3.72	333.44	322.53	560.38	1998.33	3517.00	320.20
3.73	333.40	322.49	560.32	1998.36	3517.11	320.20
3.74	333.36	322.46	560.26	1998.39	3517.22	320.20
3.75	333.33	322.42	560.21	1998.42	3517.33	320.20
3.76	333.30	322.39	560.15	1998.45	3517.43	320.20
3.77	333.26	322.36	560.09	1998.48	3517.53	320.20
3.78	333.23	322.33	560.04	1998.51	3517.63	320.20
3.79	333.19	322.29	559.98	1998.54	3517.73	320.20
3.80	333.16	322.26	559.93	1998.57	3517.83	320.20
3.81	333.13	322.23	559.88	1998.59	3517.92	320.20
3.82	333.10	322.20	559.82	1998.62	3518.01	320.20
3.83	333.07	322.17	559.77	1998.65	3518.10	320.20
3.84	333.04	322.14	559.72	1998.67	3518.19	320.20
3.85	333.01	322.11	559.67	1998.70	3518.28	320.20
3.86	332.98	322.08	559.62	1998.72	3518.37	320.20
3.87	332.95	322.05	559.57	1998.75	3518.45	320.20
3.88	332.92	322.02	559.52	1998.77	3518.53	320.20
3.89	332.89	322.00	559.47	1998.79	3518.61	320.20
3.90	332.86	321.97	559.43	1998.82	3518.69	320.20
3.91	332.83	321.94	559.38	1998.84	3518.77	320.20
3.92	332.80	321.91	559.33	1998.86	3518.84	320.20
3.93	332.78	321.89	559.29	1998.88	3518.92	320.20
3.94	332.75	321.86	559.24	1998.90	3518.99	320.20
3.95	332.72	321.84	559.20	1998.92	3519.06	320.20
3.96	332.69	321.81	559.16	1998.94	3519.13	320.20
3.97	332.67	321.78	559.11	1998.96	3519.20	320.20
3.98	332.64	321.76	559.07	1998.98	3519.26	320.20
3.99	332.62	321.74	559.03	1999.00	3519.33	320.20
4.00	332.59	321.71	558.99	1999.02	3519.39	320.20

VREME	T1	T2	T3	T4	T5	T
(1.E-6)	(K)	(K)	(K)	(K)	(K)	(K)
4.01	332.57	321.69	558.95	1999.04	3519.45	320.20
4.02	332.54	321.66	558.91	1999.06	3519.52	320.20
4.03	332.52	321.64	558.87	1999.07	3519.58	320.20
4.04	332.50	321.62	558.83	1999.09	3519.63	320.20
4.05	332.47	321.59	558.79	1999.11	3519.69	320.20
4.06	332.45	321.57	558.75	1999.12	3519.75	320.20
4.07	332.43	321.55	558.71	1999.14	3519.80	320.20
4.08	332.40	321.53	558.67	1999.16	3519.86	320.20
4.09	332.38	321.51	558.64	1999.17	3519.91	320.20
4.10	332.36	321.49	558.60	1999.19	3519.96	320.20
4.11	332.34	321.47	558.56	1999.20	3520.01	320.20
4.12	332.32	321.44	558.53	1999.22	3520.06	320.20
4.13	332.30	321.42	558.49	1999.23	3520.11	320.20
4.14	332.27	321.40	558.46	1999.24	3520.16	320.20
4.15	332.25	321.38	558.43	1999.26	3520.21	320.20
4.16	332.23	321.36	558.39	1999.27	3520.25	320.20
4.17	332.21	321.35	558.36	1999.28	3520.30	320.20
4.18	332.19	321.33	558.33	1999.30	3520.34	320.20
4.19	332.17	321.31	558.30	1999.31	3520.39	320.20
4.20	332.16	321.29	558.26	1999.32	3520.43	320.20
4.21	332.14	321.27	558.23	1999.33	3520.47	320.20
4.22	332.12	321.25	558.20	1999.35	3520.51	320.20
4.23	332.10	321.24	558.17	1999.36	3520.55	320.20
4.24	332.08	321.22	558.14	1999.37	3520.59	320.20
4.25	332.06	321.20	558.11	1999.38	3520.63	320.20
4.26	332.05	321.18	558.08	1999.39	3520.66	320.20
4.27	332.03	321.17	558.05	1999.40	3520.70	320.20
4.28	332.01	321.15	558.02	1999.41	3520.73	320.20
4.29	331.99	321.13	558.00	1999.42	3520.77	320.20
4.30	331.98	321.12	557.97	1999.43	3520.80	320.20
4.31	331.96	321.10	557.94	1999.44	3520.84	320.20
4.32	331.95	321.09	557.92	1999.45	3520.87	320.20
4.33	331.93	321.07	557.89	1999.46	3520.90	320.20
4.34	331.91	321.05	557.86	1999.47	3520.93	320.20
4.35	331.90	321.04	557.84	1999.48	3520.96	320.20
4.36	331.88	321.03	557.81	1999.49	3520.99	320.20
4.37	331.87	321.01	557.79	1999.49	3521.02	320.20
4.38	331.85	321.00	557.76	1999.50	3521.05	320.20
4.39	331.84	320.98	557.74	1999.51	3521.08	320.20
4.40	331.82	320.97	557.71	1999.52	3521.11	320.20
4.41	331.81	320.95	557.69	1999.53	3521.13	320.20
4.42	331.79	320.94	557.67	1999.53	3521.16	320.20
4.43	331.78	320.93	557.64	1999.54	3521.19	320.20
4.44	331.77	320.91	557.62	1999.55	3521.21	320.20
4.45	331.75	320.90	557.60	1999.56	3521.24	320.20
4.46	331.74	320.89	557.58	1999.56	3521.26	320.20
4.47	331.73	320.87	557.55	1999.57	3521.28	320.20
4.48	331.71	320.86	557.53	1999.58	3521.31	320.20
4.49	331.70	320.85	557.51	1999.58	3521.33	320.20
4.50	331.69	320.84	557.49	1999.59	3521.35	320.20

VREME (1.E-6)	T1 (K)	T2 (K)	T3 (K)	T4 (K)	T5 (K)	T (K)
4.51	331.68	320.83	557.47	1999.60	3521.37	320.20
4.52	331.66	320.81	557.45	1999.60	3521.39	320.20
4.53	331.65	320.80	557.43	1999.61	3521.42	320.20
4.54	331.64	320.79	557.41	1999.61	3521.44	320.20
4.55	331.63	320.78	557.39	1999.62	3521.46	320.20
4.56	331.62	320.77	557.37	1999.63	3521.47	320.20
4.57	331.60	320.76	557.35	1999.63	3521.49	320.20
4.58	331.59	320.75	557.33	1999.64	3521.51	320.20
4.59	331.58	320.74	557.31	1999.64	3521.53	320.20
4.60	331.57	320.72	557.30	1999.65	3521.55	320.20
4.61	331.56	320.71	557.28	1999.65	3521.57	320.20
4.62	331.55	320.70	557.26	1999.66	3521.58	320.20
4.63	331.54	320.69	557.24	1999.66	3521.60	320.20
4.64	331.53	320.68	557.23	1999.67	3521.61	320.20
4.65	331.52	320.67	557.21	1999.67	3521.63	320.20
4.66	331.51	320.66	557.19	1999.68	3521.65	320.20
4.67	331.50	320.65	557.18	1999.68	3521.66	320.20
4.68	331.49	320.65	557.16	1999.68	3521.68	320.20
4.69	331.48	320.64	557.14	1999.69	3521.69	320.20
4.70	331.47	320.63	557.13	1999.69	3521.70	320.20
4.71	331.46	320.62	557.11	1999.70	3521.72	320.20
4.72	331.45	320.61	557.10	1999.70	3521.73	320.20
4.73	331.44	320.60	557.08	1999.70	3521.74	320.20
4.74	331.43	320.59	557.07	1999.71	3521.76	320.20
4.75	331.42	320.58	557.05	1999.71	3521.77	320.20
4.76	331.42	320.57	557.04	1999.72	3521.78	320.20
4.77	331.41	320.57	557.02	1999.72	3521.79	320.20
4.78	331.40	320.56	557.01	1999.72	3521.81	320.20
4.79	331.39	320.55	557.00	1999.73	3521.82	320.20
4.80	331.38	320.54	556.98	1999.73	3521.83	320.20
4.81	331.37	320.53	556.97	1999.73	3521.84	320.20
4.82	331.37	320.53	556.96	1999.73	3521.85	320.20
4.83	331.36	320.52	556.94	1999.74	3521.86	320.20
4.84	331.35	320.51	556.93	1999.74	3521.87	320.20
4.85	331.34	320.50	556.92	1999.74	3521.88	320.20
4.86	331.34	320.50	556.91	1999.75	3521.89	320.20
4.87	331.33	320.49	556.89	1999.75	3521.90	320.20
4.88	331.32	320.48	556.88	1999.75	3521.91	320.20
4.89	331.31	320.47	556.87	1999.75	3521.92	320.20
4.90	331.31	320.47	556.86	1999.76	3521.92	320.20
4.91	331.30	320.46	556.85	1999.76	3521.93	320.20
4.92	331.29	320.45	556.83	1999.76	3521.94	320.20
4.93	331.29	320.45	556.82	1999.76	3521.95	320.20
4.94	331.28	320.44	556.81	1999.77	3521.96	320.20
4.95	331.27	320.43	556.80	1999.77	3521.96	320.20
4.96	331.27	320.43	556.79	1999.77	3521.97	320.20
4.97	331.26	320.42	556.78	1999.77	3521.98	320.20
4.98	331.25	320.42	556.77	1999.77	3521.99	320.20
4.99	331.25	320.41	556.76	1999.78	3521.99	320.20
5.00	331.24	320.40	556.75	1999.78	3522.00	320.20

VREME	T1	T2	T3	T4	T5	T
(1.E-6)	(K)	(K)	(K)	(K)	(K)	(K)
5.01	331.23	320.40	556.74	1999.78	3522.01	320.20
5.02	331.23	320.39	556.73	1999.78	3522.01	320.20
5.03	331.22	320.39	556.72	1999.78	3522.02	320.20
5.04	331.22	320.38	556.71	1999.79	3522.02	320.20
5.05	331.21	320.38	556.70	1999.79	3522.03	320.20
5.06	331.21	320.37	556.69	1999.79	3522.04	320.20
5.07	331.20	320.37	556.68	1999.79	3522.04	320.20
5.08	331.19	320.36	556.67	1999.79	3522.05	320.20
5.09	331.19	320.35	556.66	1999.79	3522.05	320.20
5.10	331.18	320.35	556.65	1999.79	3522.06	320.20
5.11	331.18	320.34	556.65	1999.80	3522.06	320.20
5.12	331.17	320.34	556.64	1999.80	3522.07	320.20
5.13	331.17	320.33	556.63	1999.80	3522.07	320.20
5.14	331.16	320.33	556.62	1999.80	3522.08	320.20
5.15	331.16	320.32	556.61	1999.80	3522.08	320.20
5.16	331.15	320.32	556.60	1999.80	3522.08	320.20
5.17	331.15	320.32	556.60	1999.80	3522.09	320.20
5.18	331.14	320.31	556.59	1999.80	3522.09	320.20
5.19	331.14	320.31	556.58	1999.81	3522.10	320.20
5.20	331.13	320.30	556.57	1999.81	3522.10	320.20
5.21	331.13	320.30	556.57	1999.81	3522.10	320.20
5.22	331.13	320.29	556.56	1999.81	3522.11	320.20
5.23	331.12	320.29	556.55	1999.81	3522.11	320.20
5.24	331.12	320.28	556.54	1999.81	3522.11	320.20
5.25	331.11	320.28	556.54	1999.81	3522.12	320.20
5.26	331.11	320.28	556.53	1999.81	3522.12	320.20
5.27	331.10	320.27	556.52	1999.81	3522.12	320.20
5.28	331.10	320.27	556.52	1999.81	3522.12	320.20
5.29	331.10	320.26	556.51	1999.81	3522.13	320.20
5.30	331.09	320.26	556.50	1999.82	3522.13	320.20
5.31	331.09	320.26	556.50	1999.82	3522.13	320.20
5.32	331.08	320.25	556.49	1999.82	3522.13	320.20
5.33	331.08	320.25	556.48	1999.82	3522.14	320.20
5.34	331.08	320.25	556.48	1999.82	3522.14	320.20
5.35	331.07	320.24	556.47	1999.82	3522.14	320.20
5.36	331.07	320.24	556.47	1999.82	3522.14	320.20
5.37	331.07	320.24	556.46	1999.82	3522.14	320.20
5.38	331.06	320.23	556.45	1999.82	3522.15	320.20
5.39	331.06	320.23	556.45	1999.82	3522.15	320.20
5.40	331.06	320.23	556.44	1999.82	3522.15	320.20
5.41	331.05	320.22	556.44	1999.82	3522.15	320.20
5.42	331.05	320.22	556.43	1999.82	3522.15	320.20
5.43	331.05	320.22	556.43	1999.82	3522.15	320.20
5.44	331.04	320.21	556.42	1999.82	3522.16	320.20
5.45	331.04	320.21	556.42	1999.82	3522.16	320.20
5.46	331.04	320.21	556.41	1999.82	3522.16	320.20
5.47	331.03	320.20	556.41	1999.82	3522.16	320.20
5.48	331.03	320.20	556.40	1999.82	3522.16	320.20
5.49	331.03	320.20	556.40	1999.82	3522.16	320.20
5.50	331.02	320.20	556.39	1999.82	3522.16	320.20

VREME	T1 (1.E-6)	T2 (K)	T3 (K)	T4 (K)	T5 (K)	T (K)
5.51	331.02	320.19	556.39	1999.82	3522.16	320.20
5.52	331.02	320.19	556.38	1999.83	3522.16	320.20
5.53	331.02	320.19	556.38	1999.83	3522.16	320.20
5.54	331.01	320.18	556.37	1999.83	3522.16	320.20
5.55	331.01	320.18	556.37	1999.83	3522.16	320.20
5.56	331.01	320.18	556.36	1999.83	3522.17	320.20
5.57	331.00	320.18	556.36	1999.83	3522.17	320.20
5.58	331.00	320.17	556.36	1999.83	3522.17	320.20
5.59	331.00	320.17	556.35	1999.83	3522.17	320.20
5.60	331.00	320.17	556.35	1999.83	3522.17	320.20
5.61	330.99	320.17	556.34	1999.83	3522.17	320.20
5.62	330.99	320.16	556.34	1999.83	3522.17	320.20
5.63	330.99	320.16	556.33	1999.83	3522.17	320.20
5.64	330.99	320.16	556.33	1999.83	3522.17	320.20
5.65	330.99	320.16	556.33	1999.83	3522.17	320.20
5.66	330.98	320.16	556.32	1999.83	3522.17	320.20
5.67	330.98	320.15	556.32	1999.83	3522.17	320.20
5.68	330.98	320.15	556.32	1999.83	3522.17	320.20
5.69	330.98	320.15	556.31	1999.83	3522.17	320.20
5.70	330.97	320.15	556.31	1999.83	3522.17	320.20
5.71	330.97	320.14	556.31	1999.83	3522.17	320.20
5.72	330.97	320.14	556.30	1999.83	3522.17	320.20
5.73	330.97	320.14	556.30	1999.83	3522.17	320.20
5.74	330.97	320.14	556.29	1999.83	3522.17	320.20
5.75	330.96	320.14	556.29	1999.83	3522.17	320.20
5.76	330.96	320.13	556.29	1999.83	3522.16	320.20
5.77	330.96	320.13	556.28	1999.83	3522.16	320.20
5.78	330.96	320.13	556.28	1999.82	3522.16	320.20
5.79	330.96	320.13	556.28	1999.82	3522.16	320.20
5.80	330.95	320.13	556.28	1999.82	3522.16	320.20
5.81	330.95	320.13	556.27	1999.82	3522.16	320.20
5.82	330.95	320.12	556.27	1999.82	3522.16	320.20
5.83	330.95	320.12	556.27	1999.82	3522.16	320.20
5.84	330.95	320.12	556.26	1999.82	3522.16	320.20
5.85	330.94	320.12	556.26	1999.82	3522.16	320.20
5.86	330.94	320.12	556.26	1999.82	3522.16	320.20
5.87	330.94	320.12	556.26	1999.82	3522.16	320.20
5.88	330.94	320.11	556.25	1999.82	3522.16	320.20
5.89	330.94	320.11	556.25	1999.82	3522.16	320.20
5.90	330.94	320.11	556.25	1999.82	3522.16	320.20
5.91	330.93	320.11	556.24	1999.82	3522.15	320.20
5.92	330.93	320.11	556.24	1999.82	3522.15	320.20
5.93	330.93	320.11	556.24	1999.82	3522.15	320.20
5.94	330.93	320.10	556.24	1999.82	3522.15	320.20
5.95	330.93	320.10	556.23	1999.82	3522.15	320.20
5.96	330.93	320.10	556.23	1999.82	3522.15	320.20
5.97	330.93	320.10	556.23	1999.82	3522.15	320.20
5.98	330.92	320.10	556.23	1999.82	3522.15	320.20
5.99	330.92	320.10	556.23	1999.82	3522.14	320.20
6.00	330.92	320.10	556.22	1999.82	3522.14	320.20

VREME	KIN. ENERG.	VIB. ENERG.	ELEK. ENERG.	IZL. ENERG.
(1.E-6)	(J/cm ³)	(J/cm ³)	(J/cm ³)	(J/cm ³)
.00	.18519000	.6294E-02	.0000	.0000
.01	.18519000	.6309E-02	.1455E-04	-.3939E-24
.02	.18519000	.6353E-02	.5724E-04	-.1482E-23
.03	.18519000	.6422E-02	.1267E-03	-.4034E-23
.04	.18519000	.6518E-02	.2215E-03	-.8970E-23
.05	.18519000	.6637E-02	.3404E-03	-.1753E-22
.06	.18519000	.6778E-02	.4822E-03	-.3155E-22
.07	.18519000	.6941E-02	.6457E-03	-.5412E-22
.08	.18519000	.7124E-02	.8297E-03	-.9117E-22
.09	.18519000	.7326E-02	.1033E-02	-.1570E-21
.10	.18519000	.7546E-02	.1255E-02	-.3058E-21
.11	.18519000	.7783E-02	.1494E-02	-.3621E-20
.12	.18519000	.8015E-02	.1749E-02	-.1731E-05
.13	.18519000	.8245E-02	.2020E-02	-.3407E-04
.14	.18519000	.8496E-02	.2305E-02	-.6656E-04
.15	.18519000	.8758E-02	.2604E-02	-.9868E-04
.16	.18519000	.9031E-02	.2915E-02	-.1317E-03
.17	.18519000	.9312E-02	.3239E-02	-.1659E-03
.18	.18520460	.9603E-02	.3574E-02	-.2013E-03
.19	.18522340	.9902E-02	.3919E-02	-.2380E-03
.20	.18524230	.1021E-01	.4274E-02	-.2759E-03
.21	.18526110	.1052E-01	.4638E-02	-.3148E-03
.22	.18528000	.1084E-01	.5010E-02	-.3547E-03
.23	.18529880	.1117E-01	.5390E-02	-.3955E-03
.24	.18531760	.1150E-01	.5777E-02	-.4372E-03
.25	.18533650	.1183E-01	.6171E-02	-.4797E-03
.26	.18535530	.1217E-01	.6571E-02	-.5230E-03
.27	.18537420	.1251E-01	.6977E-02	-.5669E-03
.28	.18539300	.1286E-01	.7387E-02	-.6114E-03
.29	.18541180	.1320E-01	.7802E-02	-.6565E-03
.30	.18543070	.1355E-01	.8221E-02	-.7021E-03
.31	.18544950	.1390E-01	.8644E-02	-.7481E-03
.32	.18548150	.1426E-01	.9069E-02	-.7946E-03
.33	.18551920	.1461E-01	.9498E-02	-.8414E-03
.34	.18555680	.1497E-01	.9929E-02	-.8886E-03
.35	.18559450	.1532E-01	.1036E-01	-.9360E-03
.36	.18563220	.1568E-01	.1080E-01	-.9837E-03
.37	.18566990	.1604E-01	.1123E-01	-.1032E-02
.38	.18570750	.1639E-01	.1167E-01	-.1080E-02
.39	.18574520	.1675E-01	.1211E-01	-.1128E-02
.40	.18578290	.1710E-01	.1255E-01	-.1176E-02
.41	.18582060	.1745E-01	.1298E-01	-.1225E-02
.42	.18585820	.1780E-01	.1342E-01	-.1273E-02
.43	.18589590	.1815E-01	.1386E-01	-.1322E-02
.44	.18593360	.1850E-01	.1430E-01	-.1370E-02
.45	.18597130	.1885E-01	.1473E-01	-.1419E-02
.46	.18600900	.1919E-01	.1517E-01	-.1467E-02
.47	.18605460	.1953E-01	.1560E-01	-.1515E-02
.48	.18611120	.1987E-01	.1604E-01	-.1564E-02
.49	.18616770	.2021E-01	.1647E-01	-.1612E-02
.50	.18622420	.2054E-01	.1690E-01	-.1660E-02

VREME	KIN.ENERG.	VIB.ENERG.	ELEK.ENERG.	IZL.ENERG.
(1.E-6)	(J/cm ³)	(J/cm ³)	(J/cm ³)	(J/cm ³)
.51	.18628070	.2088E-01	.1732E-01	-.1708E-02
.52	.18633720	.2120E-01	.1775E-01	-.1755E-02
.53	.18639370	.2153E-01	.1817E-01	-.1803E-02
.54	.18645020	.2185E-01	.1859E-01	-.1850E-02
.55	.18650680	.2217E-01	.1901E-01	-.1897E-02
.56	.18656330	.2249E-01	.1942E-01	-.1944E-02
.57	.18661980	.2280E-01	.1984E-01	-.1991E-02
.58	.18667630	.2311E-01	.2025E-01	-.2037E-02
.59	.18673280	.2341E-01	.2065E-01	-.2083E-02
.60	.18678930	.2371E-01	.2106E-01	-.2129E-02
.61	.18684590	.2401E-01	.2146E-01	-.2174E-02
.62	.18690240	.2431E-01	.2186E-01	-.2220E-02
.63	.18695890	.2460E-01	.2225E-01	-.2265E-02
.64	.18701540	.2488E-01	.2264E-01	-.2309E-02
.65	.18707190	.2517E-01	.2303E-01	-.2354E-02
.66	.18712840	.2544E-01	.2341E-01	-.2398E-02
.67	.18718490	.2572E-01	.2379E-01	-.2441E-02
.68	.18724150	.2599E-01	.2417E-01	-.2485E-02
.69	.18729800	.2626E-01	.2454E-01	-.2528E-02
.70	.18736370	.2652E-01	.2491E-01	-.2571E-02
.71	.18743910	.2678E-01	.2527E-01	-.2613E-02
.72	.18751440	.2704E-01	.2564E-01	-.2655E-02
.73	.18758980	.2729E-01	.2599E-01	-.2696E-02
.74	.18766510	.2754E-01	.2635E-01	-.2738E-02
.75	.18774050	.2778E-01	.2670E-01	-.2779E-02
.76	.18781580	.2802E-01	.2704E-01	-.2819E-02
.77	.18789120	.2825E-01	.2739E-01	-.2859E-02
.78	.18796650	.2849E-01	.2772E-01	-.2899E-02
.79	.18804190	.2872E-01	.2806E-01	-.2938E-02
.80	.18811730	.2894E-01	.2839E-01	-.2977E-02
.81	.18819260	.2916E-01	.2872E-01	-.3016E-02
.82	.18826800	.2938E-01	.2904E-01	-.3054E-02
.83	.18834330	.2959E-01	.2936E-01	-.3092E-02
.84	.18841870	.2980E-01	.2967E-01	-.3130E-02
.85	.18849400	.3000E-01	.2999E-01	-.3167E-02
.86	.18856940	.3020E-01	.3029E-01	-.3203E-02
.87	.18864470	.3040E-01	.3060E-01	-.3240E-02
.88	.18872010	.3060E-01	.3090E-01	-.3276E-02
.89	.18879540	.3079E-01	.3119E-01	-.3311E-02
.90	.18887080	.3097E-01	.3148E-01	-.3346E-02
.91	.18894610	.3116E-01	.3177E-01	-.3381E-02
.92	.18902150	.3134E-01	.3206E-01	-.3415E-02
.93	.18909690	.3151E-01	.3234E-01	-.3449E-02
.94	.18917220	.3169E-01	.3261E-01	-.3483E-02
.95	.18924760	.3186E-01	.3289E-01	-.3516E-02
.96	.18932290	.3202E-01	.3316E-01	-.3549E-02
.97	.18939830	.3218E-01	.3342E-01	-.3582E-02
.98	.18947360	.3234E-01	.3368E-01	-.3614E-02
.99	.18954900	.3250E-01	.3394E-01	-.3646E-02
1.00	.18962430	.3265E-01	.3420E-01	-.3677E-02

VREME	KIN. ENERG.	VIB. ENERG.	ELEK. ENERG.	IZL. ENERG.
(1.E-6)	(J/cm ³)	(J/cm ³)	(J/cm ³)	(J/cm ³)
1.01	.18969970	.3280E-01	.3445E-01	-.3708E-02
1.02	.18977500	.3295E-01	.3470E-01	-.3739E-02
1.03	.18985040	.3309E-01	.3494E-01	-.3769E-02
1.04	.18992570	.3323E-01	.3518E-01	-.3799E-02
1.05	.19000110	.3337E-01	.3542E-01	-.3828E-02
1.06	.19007650	.3350E-01	.3565E-01	-.3858E-02
1.07	.19015180	.3363E-01	.3588E-01	-.3886E-02
1.08	.19022720	.3376E-01	.3611E-01	-.3915E-02
1.09	.19030250	.3389E-01	.3633E-01	-.3943E-02
1.10	.19037790	.3401E-01	.3655E-01	-.3971E-02
1.11	.19045320	.3413E-01	.3677E-01	-.3998E-02
1.12	.19052860	.3425E-01	.3698E-01	-.4025E-02
1.13	.19060390	.3436E-01	.3719E-01	-.4052E-02
1.14	.19067930	.3447E-01	.3740E-01	-.4078E-02
1.15	.19075460	.3458E-01	.3761E-01	-.4104E-02
1.16	.19083000	.3469E-01	.3781E-01	-.4130E-02
1.17	.19090530	.3479E-01	.3800E-01	-.4155E-02
1.18	.19098070	.3489E-01	.3820E-01	-.4180E-02
1.19	.19105610	.3499E-01	.3839E-01	-.4205E-02
1.20	.19113140	.3509E-01	.3858E-01	-.4229E-02
1.21	.19120680	.3518E-01	.3877E-01	-.4253E-02
1.22	.19128210	.3527E-01	.3895E-01	-.4277E-02
1.23	.19135750	.3536E-01	.3913E-01	-.4300E-02
1.24	.19143280	.3545E-01	.3931E-01	-.4324E-02
1.25	.19150820	.3554E-01	.3948E-01	-.4346E-02
1.26	.19158350	.3562E-01	.3965E-01	-.4369E-02
1.27	.19165890	.3570E-01	.3982E-01	-.4391E-02
1.28	.19173420	.3578E-01	.3999E-01	-.4413E-02
1.29	.19180960	.3586E-01	.4015E-01	-.4434E-02
1.30	.19188490	.3593E-01	.4031E-01	-.4456E-02
1.31	.19196030	.3601E-01	.4047E-01	-.4477E-02
1.32	.19202030	.3608E-01	.4063E-01	-.4497E-02
1.33	.19207680	.3615E-01	.4078E-01	-.4518E-02
1.34	.19213330	.3621E-01	.4093E-01	-.4538E-02
1.35	.19218980	.3628E-01	.4108E-01	-.4558E-02
1.36	.19224630	.3634E-01	.4123E-01	-.4577E-02
1.37	.19230280	.3640E-01	.4137E-01	-.4596E-02
1.38	.19235940	.3646E-01	.4151E-01	-.4615E-02
1.39	.19241590	.3652E-01	.4165E-01	-.4634E-02
1.40	.19247240	.3658E-01	.4179E-01	-.4653E-02
1.41	.19252890	.3663E-01	.4192E-01	-.4671E-02
1.42	.19258540	.3669E-01	.4205E-01	-.4689E-02
1.43	.19264190	.3674E-01	.4218E-01	-.4707E-02
1.44	.19269840	.3679E-01	.4231E-01	-.4724E-02
1.45	.19275500	.3684E-01	.4244E-01	-.4741E-02
1.46	.19281150	.3689E-01	.4256E-01	-.4758E-02
1.47	.19286800	.3693E-01	.4268E-01	-.4775E-02
1.48	.19292450	.3698E-01	.4280E-01	-.4791E-02
1.49	.19298100	.3702E-01	.4292E-01	-.4807E-02
1.50	.19303750	.3706E-01	.4303E-01	-.4823E-02

VREME	KIN. ENERG.	VIB. ENERG.	ELEK. ENERG.	IZL. ENERG.
(1.E-6)	(J/cm ³)	(J/cm ³)	(J/cm ³)	(J/cm ³)
1.51	.19309410	.3710E-01	.4315E-01	-.4839E-02
1.52	.19315060	.3714E-01	.4326E-01	-.4855E-02
1.53	.19320710	.3718E-01	.4337E-01	-.4870E-02
1.54	.19326360	.3722E-01	.4347E-01	-.4885E-02
1.55	.19332010	.3725E-01	.4358E-01	-.4900E-02
1.56	.19337660	.3729E-01	.4368E-01	-.4914E-02
1.57	.19343320	.3732E-01	.4379E-01	-.4929E-02
1.58	.19348970	.3735E-01	.4389E-01	-.4943E-02
1.59	.19354620	.3738E-01	.4399E-01	-.4957E-02
1.60	.19360270	.3741E-01	.4408E-01	-.4971E-02
1.61	.19365920	.3744E-01	.4418E-01	-.4984E-02
1.62	.19371570	.3747E-01	.4427E-01	-.4997E-02
1.63	.19377220	.3750E-01	.4437E-01	-.5011E-02
1.64	.19382880	.3752E-01	.4445E-01	-.5023E-02
1.65	.19388530	.3755E-01	.4454E-01	-.5036E-02
1.66	.19394180	.3757E-01	.4463E-01	-.5049E-02
1.67	.19399830	.3760E-01	.4472E-01	-.5061E-02
1.68	.19405480	.3762E-01	.4480E-01	-.5073E-02
1.69	.19411130	.3764E-01	.4488E-01	-.5085E-02
1.70	.19416790	.3766E-01	.4496E-01	-.5097E-02
1.71	.19422440	.3768E-01	.4504E-01	-.5108E-02
1.72	.19428090	.3770E-01	.4512E-01	-.5120E-02
1.73	.19433740	.3772E-01	.4520E-01	-.5131E-02
1.74	.19439390	.3774E-01	.4528E-01	-.5142E-02
1.75	.19444610	.3776E-01	.4535E-01	-.5153E-02
1.76	.19448380	.3777E-01	.4542E-01	-.5164E-02
1.77	.19452150	.3779E-01	.4550E-01	-.5174E-02
1.78	.19455910	.3780E-01	.4556E-01	-.5185E-02
1.79	.19459680	.3782E-01	.4563E-01	-.5195E-02
1.80	.19463450	.3783E-01	.4570E-01	-.5205E-02
1.81	.19467220	.3785E-01	.4577E-01	-.5215E-02
1.82	.19470980	.3786E-01	.4583E-01	-.5225E-02
1.83	.19474750	.3787E-01	.4590E-01	-.5234E-02
1.84	.19478520	.3788E-01	.4596E-01	-.5244E-02
1.85	.19482290	.3789E-01	.4603E-01	-.5253E-02
1.86	.19486050	.3790E-01	.4609E-01	-.5262E-02
1.87	.19489820	.3791E-01	.4614E-01	-.5271E-02
1.88	.19493590	.3792E-01	.4620E-01	-.5280E-02
1.89	.19497360	.3793E-01	.4626E-01	-.5289E-02
1.90	.19501130	.3794E-01	.4632E-01	-.5297E-02
1.91	.19504890	.3795E-01	.4637E-01	-.5306E-02
1.92	.19508660	.3795E-01	.4643E-01	-.5314E-02
1.93	.19512430	.3796E-01	.4648E-01	-.5322E-02
1.94	.19516200	.3797E-01	.4654E-01	-.5330E-02
1.95	.19519960	.3797E-01	.4659E-01	-.5338E-02
1.96	.19523730	.3798E-01	.4664E-01	-.5346E-02
1.97	.19527500	.3798E-01	.4669E-01	-.5353E-02
1.98	.19531270	.3799E-01	.4674E-01	-.5361E-02
1.99	.19535030	.3799E-01	.4679E-01	-.5368E-02
2.00	.19538800	.3800E-01	.4683E-01	-.5376E-02

VREME	KIN.ENERG.	VIB.ENERG.	ELEK.ENERG.	IZL.ENERG.
	(1.E-6) (J/cm ³)	(J/cm ³)	(J/cm ³)	(J/cm ³)
2.01	.19542570	.3800E-01	.4688E-01	-.5383E-02
2.02	.19546340	.3800E-01	.4692E-01	-.5390E-02
2.03	.19550110	.3801E-01	.4697E-01	-.5397E-02
2.04	.19553870	.3801E-01	.4701E-01	-.5404E-02
2.05	.19557640	.3801E-01	.4706E-01	-.5411E-02
2.06	.19561410	.3801E-01	.4710E-01	-.5417E-02
2.07	.19565180	.3801E-01	.4714E-01	-.5423E-02
2.08	.19568940	.3802E-01	.4718E-01	-.5430E-02
2.09	.19572710	.3802E-01	.4722E-01	-.5436E-02
2.10	.19576480	.3802E-01	.4726E-01	-.5443E-02
2.11	.19580250	.3802E-01	.4730E-01	-.5449E-02
2.12	.19584020	.3802E-01	.4734E-01	-.5454E-02
2.13	.19587780	.3802E-01	.4738E-01	-.5460E-02
2.14	.19591550	.3802E-01	.4741E-01	-.5466E-02
2.15	.19595320	.3802E-01	.4744E-01	-.5472E-02
2.16	.19599090	.3802E-01	.4748E-01	-.5478E-02
2.17	.19602850	.3802E-01	.4751E-01	-.5483E-02
2.18	.19606620	.3802E-01	.4755E-01	-.5488E-02
2.19	.19610390	.3802E-01	.4758E-01	-.5493E-02
2.20	.19614160	.3802E-01	.4762E-01	-.5499E-02
2.21	.19617670	.3802E-01	.4765E-01	-.5504E-02
2.22	.19619550	.3801E-01	.4768E-01	-.5509E-02
2.23	.19621430	.3801E-01	.4771E-01	-.5514E-02
2.24	.19623320	.3801E-01	.4774E-01	-.5519E-02
2.25	.19625200	.3801E-01	.4777E-01	-.5524E-02
2.26	.19627090	.3801E-01	.4780E-01	-.5528E-02
2.27	.19628970	.3801E-01	.4783E-01	-.5533E-02
2.28	.19630850	.3800E-01	.4786E-01	-.5538E-02
2.29	.19632740	.3800E-01	.4789E-01	-.5542E-02
2.30	.19634620	.3800E-01	.4791E-01	-.5547E-02
2.31	.19636500	.3800E-01	.4794E-01	-.5551E-02
2.32	.19638390	.3799E-01	.4796E-01	-.5555E-02
2.33	.19640270	.3799E-01	.4798E-01	-.5559E-02
2.34	.19642160	.3799E-01	.4801E-01	-.5563E-02
2.35	.19644040	.3798E-01	.4803E-01	-.5567E-02
2.36	.19645920	.3798E-01	.4806E-01	-.5571E-02
2.37	.19647810	.3798E-01	.4808E-01	-.5575E-02
2.38	.19649690	.3797E-01	.4811E-01	-.5580E-02
2.39	.19651580	.3797E-01	.4813E-01	-.5584E-02
2.40	.19653460	.3797E-01	.4816E-01	-.5587E-02
2.41	.19655340	.3796E-01	.4818E-01	-.5591E-02
2.42	.19657230	.3796E-01	.4820E-01	-.5594E-02
2.43	.19659110	.3796E-01	.4822E-01	-.5597E-02
2.44	.19660990	.3795E-01	.4824E-01	-.5601E-02
2.45	.19662880	.3795E-01	.4825E-01	-.5604E-02
2.46	.19664760	.3794E-01	.4827E-01	-.5608E-02
2.47	.19666650	.3794E-01	.4829E-01	-.5611E-02
2.48	.19668530	.3794E-01	.4831E-01	-.5615E-02
2.49	.19670410	.3793E-01	.4833E-01	-.5618E-02
2.50	.19672300	.3793E-01	.4835E-01	-.5621E-02

VREME	KIN.ENERG.	VIB.ENERG.	ELEK.ENERG.	IZL.ENERG.
(1.E-6)	(J/cm ³)	(J/cm ³)	(J/cm ³)	(J/cm ³)
2.51	.19674180	.3792E-01	.4837E-01	-.5624E-02
2.52	.19676070	.3792E-01	.4839E-01	-.5627E-02
2.53	.19677950	.3791E-01	.4841E-01	-.5630E-02
2.54	.19679830	.3791E-01	.4843E-01	-.5633E-02
2.55	.19681720	.3791E-01	.4844E-01	-.5636E-02
2.56	.19683600	.3790E-01	.4846E-01	-.5639E-02
2.57	.19685480	.3790E-01	.4847E-01	-.5641E-02
2.58	.19687370	.3789E-01	.4849E-01	-.5644E-02
2.59	.19689250	.3789E-01	.4850E-01	-.5647E-02
2.60	.19691140	.3788E-01	.4852E-01	-.5650E-02
2.61	.19693020	.3788E-01	.4853E-01	-.5653E-02
2.62	.19694900	.3787E-01	.4855E-01	-.5655E-02
2.63	.19696790	.3787E-01	.4856E-01	-.5657E-02
2.64	.19698670	.3787E-01	.4858E-01	-.5660E-02
2.65	.19700560	.3786E-01	.4859E-01	-.5662E-02
2.66	.19702440	.3786E-01	.4860E-01	-.5664E-02
2.67	.19704320	.3785E-01	.4862E-01	-.5667E-02
2.68	.19706210	.3785E-01	.4863E-01	-.5669E-02
2.69	.19708090	.3784E-01	.4865E-01	-.5671E-02
2.70	.19709970	.3784E-01	.4866E-01	-.5674E-02
2.71	.19711860	.3783E-01	.4868E-01	-.5676E-02
2.72	.19713740	.3783E-01	.4869E-01	-.5678E-02
2.73	.19715630	.3783E-01	.4870E-01	-.5681E-02
2.74	.19717510	.3782E-01	.4871E-01	-.5683E-02
2.75	.19719390	.3782E-01	.4872E-01	-.5685E-02
2.76	.19721280	.3781E-01	.4873E-01	-.5687E-02
2.77	.19723160	.3781E-01	.4874E-01	-.5688E-02
2.78	.19725050	.3780E-01	.4875E-01	-.5690E-02
2.79	.19726930	.3780E-01	.4875E-01	-.5692E-02
2.80	.19728810	.3780E-01	.4876E-01	-.5694E-02
2.81	.19730700	.3779E-01	.4877E-01	-.5695E-02
2.82	.19732580	.3779E-01	.4878E-01	-.5697E-02
2.83	.19734460	.3778E-01	.4879E-01	-.5699E-02
2.84	.19736350	.3778E-01	.4880E-01	-.5701E-02
2.85	.19738230	.3778E-01	.4881E-01	-.5702E-02
2.86	.19740120	.3777E-01	.4882E-01	-.5704E-02
2.87	.19742000	.3777E-01	.4883E-01	-.5706E-02
2.88	.19743880	.3776E-01	.4884E-01	-.5708E-02
2.89	.19745770	.3776E-01	.4885E-01	-.5709E-02
2.90	.19747650	.3776E-01	.4886E-01	-.5711E-02
2.91	.19749540	.3775E-01	.4887E-01	-.5713E-02
2.92	.19751420	.3775E-01	.4888E-01	-.5715E-02
2.93	.19753300	.3774E-01	.4889E-01	-.5716E-02
2.94	.19755190	.3774E-01	.4890E-01	-.5718E-02
2.95	.19757070	.3774E-01	.4891E-01	-.5719E-02
2.96	.19758950	.3773E-01	.4892E-01	-.5720E-02
2.97	.19760840	.3773E-01	.4893E-01	-.5721E-02
2.98	.19762720	.3772E-01	.4894E-01	-.5722E-02
2.99	.19764610	.3772E-01	.4894E-01	-.5724E-02
3.00	.19765690	.3772E-01	.4895E-01	-.5725E-02

VREME	KIN. ENERG.	VIB. ENERG.	ELEK. ENERG.	IZL. ENERG.
(1.E-6)	(J/cm ³)	(J/cm ³)	(J/cm ³)	(J/cm ³)
3.01	.19765690	.3771E-01	.4895E-01	-.5726E-02
3.02	.19765690	.3771E-01	.4896E-01	-.5727E-02
3.03	.19765690	.3771E-01	.4896E-01	-.5728E-02
3.04	.19765690	.3770E-01	.4897E-01	-.5729E-02
3.05	.19765690	.3770E-01	.4897E-01	-.5731E-02
3.06	.19765690	.3770E-01	.4898E-01	-.5732E-02
3.07	.19765690	.3769E-01	.4898E-01	-.5733E-02
3.08	.19765690	.3769E-01	.4899E-01	-.5734E-02
3.09	.19765690	.3769E-01	.4899E-01	-.5735E-02
3.10	.19765690	.3768E-01	.4900E-01	-.5736E-02
3.11	.19765690	.3768E-01	.4900E-01	-.5737E-02
3.12	.19765690	.3768E-01	.4901E-01	-.5739E-02
3.13	.19765690	.3767E-01	.4901E-01	-.5740E-02
3.14	.19765690	.3767E-01	.4902E-01	-.5741E-02
3.15	.19765690	.3767E-01	.4902E-01	-.5742E-02
3.16	.19765690	.3766E-01	.4903E-01	-.5743E-02
3.17	.19765690	.3766E-01	.4903E-01	-.5744E-02
3.18	.19765690	.3766E-01	.4904E-01	-.5746E-02
3.19	.19765690	.3765E-01	.4904E-01	-.5747E-02
3.20	.19765690	.3765E-01	.4904E-01	-.5748E-02
3.21	.19765690	.3765E-01	.4905E-01	-.5749E-02
3.22	.19765690	.3764E-01	.4905E-01	-.5750E-02
3.23	.19765690	.3764E-01	.4906E-01	-.5751E-02
3.24	.19765690	.3764E-01	.4906E-01	-.5752E-02
3.25	.19765690	.3763E-01	.4907E-01	-.5753E-02
3.26	.19765690	.3763E-01	.4907E-01	-.5753E-02
3.27	.19765690	.3763E-01	.4908E-01	-.5754E-02
3.28	.19765690	.3762E-01	.4908E-01	-.5755E-02
3.29	.19765690	.3762E-01	.4909E-01	-.5755E-02
3.30	.19765690	.3762E-01	.4909E-01	-.5756E-02
3.31	.19765690	.3761E-01	.4910E-01	-.5756E-02
3.32	.19765690	.3761E-01	.4910E-01	-.5757E-02
3.33	.19765690	.3761E-01	.4911E-01	-.5758E-02
3.34	.19765690	.3760E-01	.4911E-01	-.5758E-02
3.35	.19765690	.3760E-01	.4912E-01	-.5759E-02
3.36	.19765690	.3760E-01	.4912E-01	-.5759E-02
3.37	.19765690	.3759E-01	.4913E-01	-.5760E-02
3.38	.19765690	.3759E-01	.4913E-01	-.5760E-02
3.39	.19765690	.3759E-01	.4914E-01	-.5761E-02
3.40	.19765690	.3758E-01	.4914E-01	-.5762E-02
3.41	.19765690	.3758E-01	.4915E-01	-.5762E-02
3.42	.19765690	.3758E-01	.4915E-01	-.5763E-02
3.43	.19765690	.3758E-01	.4916E-01	-.5763E-02
3.44	.19765690	.3757E-01	.4916E-01	-.5764E-02
3.45	.19765690	.3757E-01	.4917E-01	-.5765E-02
3.46	.19765690	.3757E-01	.4917E-01	-.5765E-02
3.47	.19765690	.3756E-01	.4918E-01	-.5766E-02
3.48	.19765690	.3756E-01	.4918E-01	-.5766E-02
3.49	.19765690	.3756E-01	.4919E-01	-.5767E-02
3.50	.19765690	.3756E-01	.4919E-01	-.5767E-02

VREME	KIN.ENERG.	VIB.ENERG.	ELEK.ENERG.	IZL.ENERG.
(1.E-6)	(J/cm ³)	(J/cm ³)	(J/cm ³)	(J/cm ³)
3.51	.19765690	.3755E-01	.4920E-01	-.5768E-02
3.52	.19765690	.3755E-01	.4920E-01	-.5769E-02
3.53	.19765690	.3755E-01	.4921E-01	-.5769E-02
3.54	.19765690	.3755E-01	.4921E-01	-.5770E-02
3.55	.19765690	.3754E-01	.4921E-01	-.5770E-02
3.56	.19765690	.3754E-01	.4921E-01	-.5771E-02
3.57	.19765690	.3754E-01	.4921E-01	-.5771E-02
3.58	.19765690	.3753E-01	.4921E-01	-.5772E-02
3.59	.19765690	.3753E-01	.4921E-01	-.5773E-02
3.60	.19765690	.3753E-01	.4921E-01	-.5773E-02
3.61	.19765690	.3753E-01	.4921E-01	-.5774E-02
3.62	.19765690	.3752E-01	.4921E-01	-.5774E-02
3.63	.19765690	.3752E-01	.4921E-01	-.5775E-02
3.64	.19765690	.3752E-01	.4921E-01	-.5776E-02
3.65	.19765690	.3752E-01	.4921E-01	-.5776E-02
3.66	.19765690	.3751E-01	.4921E-01	-.5777E-02
3.67	.19765690	.3751E-01	.4921E-01	-.5777E-02
3.68	.19765690	.3751E-01	.4921E-01	-.5778E-02
3.69	.19765690	.3751E-01	.4921E-01	-.5778E-02
3.70	.19765690	.3751E-01	.4921E-01	-.5779E-02
3.71	.19765690	.3750E-01	.4921E-01	-.5780E-02
3.72	.19765690	.3750E-01	.4921E-01	-.5780E-02
3.73	.19765690	.3750E-01	.4921E-01	-.5781E-02
3.74	.19765690	.3750E-01	.4921E-01	-.5781E-02
3.75	.19765690	.3749E-01	.4921E-01	-.5782E-02
3.76	.19765690	.3749E-01	.4921E-01	-.5783E-02
3.77	.19765690	.3749E-01	.4921E-01	-.5783E-02
3.78	.19765690	.3749E-01	.4921E-01	-.5784E-02
3.79	.19765690	.3749E-01	.4921E-01	-.5784E-02
3.80	.19765690	.3748E-01	.4921E-01	-.5785E-02
3.81	.19765690	.3748E-01	.4921E-01	-.5785E-02
3.82	.19765690	.3748E-01	.4921E-01	-.5786E-02
3.83	.19765690	.3748E-01	.4921E-01	-.5787E-02
3.84	.19765690	.3748E-01	.4921E-01	-.5787E-02
3.85	.19765690	.3747E-01	.4921E-01	-.5788E-02
3.86	.19765690	.3747E-01	.4921E-01	-.5788E-02
3.87	.19765690	.3747E-01	.4921E-01	-.5789E-02
3.88	.19765690	.3747E-01	.4921E-01	-.5789E-02
3.89	.19765690	.3747E-01	.4921E-01	-.5790E-02
3.90	.19765690	.3746E-01	.4921E-01	-.5791E-02
3.91	.19765690	.3746E-01	.4921E-01	-.5791E-02
3.92	.19765690	.3746E-01	.4921E-01	-.5791E-02
3.93	.19765690	.3746E-01	.4921E-01	-.5791E-02
3.94	.19765690	.3746E-01	.4921E-01	-.5791E-02
3.95	.19765690	.3745E-01	.4921E-01	-.5791E-02
3.96	.19765690	.3745E-01	.4921E-01	-.5791E-02
3.97	.19765690	.3745E-01	.4921E-01	-.5791E-02
3.98	.19765690	.3745E-01	.4921E-01	-.5791E-02
3.99	.19765690	.3745E-01	.4921E-01	-.5791E-02
4.00	.19765690	.3745E-01	.4921E-01	-.5791E-02

VREME	KIN.ENERG.	VIB.ENERG.	ELEK.ENERG.	IZL.ENERG.
(1.E-6)	(J/cm ³)	(J/cm ³)	(J/cm ³)	(J/cm ³)
4.01	.19765690	.3744E-01	.4921E-01	-.5791E-02
4.02	.19765690	.3744E-01	.4921E-01	-.5791E-02
4.03	.19765690	.3744E-01	.4921E-01	-.5791E-02
4.04	.19765690	.3744E-01	.4921E-01	-.5791E-02
4.05	.19765690	.3744E-01	.4921E-01	-.5791E-02
4.06	.19765690	.3744E-01	.4921E-01	-.5791E-02
4.07	.19765690	.3743E-01	.4921E-01	-.5791E-02
4.08	.19765690	.3743E-01	.4921E-01	-.5791E-02
4.09	.19765690	.3743E-01	.4921E-01	-.5791E-02
4.10	.19765690	.3743E-01	.4921E-01	-.5791E-02
4.11	.19765690	.3743E-01	.4921E-01	-.5791E-02
4.12	.19765690	.3743E-01	.4921E-01	-.5791E-02
4.13	.19765690	.3743E-01	.4921E-01	-.5791E-02
4.14	.19765690	.3742E-01	.4921E-01	-.5791E-02
4.15	.19765690	.3742E-01	.4921E-01	-.5791E-02
4.16	.19765690	.3742E-01	.4921E-01	-.5791E-02
4.17	.19765690	.3742E-01	.4921E-01	-.5791E-02
4.18	.19765690	.3742E-01	.4921E-01	-.5791E-02
4.19	.19765690	.3742E-01	.4921E-01	-.5791E-02
4.20	.19765690	.3742E-01	.4921E-01	-.5791E-02
4.21	.19765690	.3741E-01	.4921E-01	-.5791E-02
4.22	.19765690	.3741E-01	.4921E-01	-.5791E-02
4.23	.19765690	.3741E-01	.4921E-01	-.5791E-02
4.24	.19765690	.3741E-01	.4921E-01	-.5791E-02
4.25	.19765690	.3741E-01	.4921E-01	-.5791E-02
4.26	.19765690	.3741E-01	.4921E-01	-.5791E-02
4.27	.19765690	.3741E-01	.4921E-01	-.5791E-02
4.28	.19765690	.3741E-01	.4921E-01	-.5791E-02
4.29	.19765690	.3740E-01	.4921E-01	-.5791E-02
4.30	.19765690	.3740E-01	.4921E-01	-.5791E-02
4.31	.19765690	.3740E-01	.4921E-01	-.5791E-02
4.32	.19765690	.3740E-01	.4921E-01	-.5791E-02
4.33	.19765690	.3740E-01	.4921E-01	-.5791E-02
4.34	.19765690	.3740E-01	.4921E-01	-.5791E-02
4.35	.19765690	.3740E-01	.4921E-01	-.5791E-02
4.36	.19765690	.3740E-01	.4921E-01	-.5791E-02
4.37	.19765690	.3740E-01	.4921E-01	-.5791E-02
4.38	.19765690	.3739E-01	.4921E-01	-.5791E-02
4.39	.19765690	.3739E-01	.4921E-01	-.5791E-02
4.40	.19765690	.3739E-01	.4921E-01	-.5791E-02
4.41	.19765690	.3739E-01	.4921E-01	-.5791E-02
4.42	.19765690	.3739E-01	.4921E-01	-.5791E-02
4.43	.19765690	.3739E-01	.4921E-01	-.5791E-02
4.44	.19765690	.3739E-01	.4921E-01	-.5791E-02
4.45	.19765690	.3739E-01	.4921E-01	-.5791E-02
4.46	.19765690	.3739E-01	.4921E-01	-.5791E-02
4.47	.19765690	.3738E-01	.4921E-01	-.5791E-02
4.48	.19765690	.3738E-01	.4921E-01	-.5791E-02
4.49	.19765690	.3738E-01	.4921E-01	-.5791E-02
4.50	.19765690	.3738E-01	.4921E-01	-.5791E-02

VREME	KIN. ENERG.	VIB. ENERG.	ELEK. ENERG.	IZL. ENERG.
(1.E-6)	(J/cm ³)	(J/cm ³)	(J/cm ³)	(J/cm ³)
4.51	.19765690	.3738E-01	.4921E-01	-.5791E-02
4.52	.19765690	.3738E-01	.4921E-01	-.5791E-02
4.53	.19765690	.3738E-01	.4921E-01	-.5791E-02
4.54	.19765690	.3738E-01	.4921E-01	-.5791E-02
4.55	.19765690	.3738E-01	.4921E-01	-.5791E-02
4.56	.19765690	.3738E-01	.4921E-01	-.5791E-02
4.57	.19765690	.3738E-01	.4921E-01	-.5791E-02
4.58	.19765690	.3737E-01	.4921E-01	-.5791E-02
4.59	.19765690	.3737E-01	.4921E-01	-.5791E-02
4.60	.19765690	.3737E-01	.4921E-01	-.5791E-02
4.61	.19765690	.3737E-01	.4921E-01	-.5791E-02
4.62	.19765690	.3737E-01	.4921E-01	-.5791E-02
4.63	.19765690	.3737E-01	.4921E-01	-.5791E-02
4.64	.19765690	.3737E-01	.4921E-01	-.5791E-02
4.65	.19765690	.3737E-01	.4921E-01	-.5791E-02
4.66	.19765690	.3737E-01	.4921E-01	-.5791E-02
4.67	.19765690	.3737E-01	.4921E-01	-.5791E-02
4.68	.19765690	.3737E-01	.4921E-01	-.5791E-02
4.69	.19765690	.3737E-01	.4921E-01	-.5791E-02
4.70	.19765690	.3737E-01	.4921E-01	-.5791E-02
4.71	.19765690	.3736E-01	.4921E-01	-.5791E-02
4.72	.19765690	.3736E-01	.4921E-01	-.5791E-02
4.73	.19765690	.3736E-01	.4921E-01	-.5791E-02
4.74	.19765690	.3736E-01	.4921E-01	-.5791E-02
4.75	.19765690	.3736E-01	.4921E-01	-.5791E-02
4.76	.19765690	.3736E-01	.4921E-01	-.5791E-02
4.77	.19765690	.3736E-01	.4921E-01	-.5791E-02
4.78	.19765690	.3736E-01	.4921E-01	-.5791E-02
4.79	.19765690	.3736E-01	.4921E-01	-.5791E-02
4.80	.19765690	.3736E-01	.4921E-01	-.5791E-02
4.81	.19765690	.3736E-01	.4921E-01	-.5791E-02
4.82	.19765690	.3736E-01	.4921E-01	-.5791E-02
4.83	.19765690	.3736E-01	.4921E-01	-.5791E-02
4.84	.19765690	.3736E-01	.4921E-01	-.5791E-02
4.85	.19765690	.3736E-01	.4921E-01	-.5791E-02
4.86	.19765690	.3736E-01	.4921E-01	-.5791E-02
4.87	.19765690	.3735E-01	.4921E-01	-.5791E-02
4.88	.19765690	.3735E-01	.4921E-01	-.5791E-02
4.89	.19765690	.3735E-01	.4921E-01	-.5791E-02
4.90	.19765690	.3735E-01	.4921E-01	-.5791E-02
4.91	.19765690	.3735E-01	.4921E-01	-.5791E-02
4.92	.19765690	.3735E-01	.4921E-01	-.5791E-02
4.93	.19765690	.3735E-01	.4921E-01	-.5791E-02
4.94	.19765690	.3735E-01	.4921E-01	-.5791E-02
4.95	.19765690	.3735E-01	.4921E-01	-.5791E-02
4.96	.19765690	.3735E-01	.4921E-01	-.5791E-02
4.97	.19765690	.3735E-01	.4921E-01	-.5791E-02
4.98	.19765690	.3735E-01	.4921E-01	-.5791E-02
4.99	.19765690	.3735E-01	.4921E-01	-.5791E-02
5.00	.19765690	.3735E-01	.4921E-01	-.5791E-02

VREME (1.E-6)	POJACANJE (1/cm)	KONC. ELEKTRONA (1.E+12 1/cm ³)	IZL. SNAGA (W)
.00	-.8485	.000000	.0000
.01	-.8485	.585188	.9850E-14
.02	-.8233	1.141470	.2687E-13
.03	-.7809	1.669934	.5699E-13
.04	-.7230	2.171734	.1038E-12
.05	-.6503	2.647788	.1741E-12
.06	-.5637	3.099067	.2814E-12
.07	-.4639	3.526379	.4538E-12
.08	-.3517	3.930794	.7623E-12
.09	-.2277	4.313191	.1444E-11
.10	-.9274E-01	4.674421	.4029E-11
.11	.5257E-01	5.015303	.5844E-09
.12	.1149E-01	5.336649	.4019E+06
.13	.3801E-02	5.639396	.5321E+06
.14	.3977E-02	5.924068	.5106E+06
.15	.4098E-02	6.191381	.5177E+06
.16	.4125E-02	6.442025	.5358E+06
.17	.4123E-02	6.676666	.5561E+06
.18	.4114E-02	6.895948	.5761E+06
.19	.4105E-02	7.100491	.5950E+06
.20	.4095E-02	7.290895	.6127E+06
.21	.4087E-02	7.467740	.6292E+06
.22	.4080E-02	7.631581	.6446E+06
.23	.4072E-02	7.782958	.6589E+06
.24	.4066E-02	7.922390	.6721E+06
.25	.4060E-02	8.050380	.6843E+06
.26	.4054E-02	8.167408	.6955E+06
.27	.4049E-02	8.273943	.7058E+06
.28	.4045E-02	8.370433	.7152E+06
.29	.4041E-02	8.457313	.7237E+06
.30	.4037E-02	8.535000	.7315E+06
.31	.4033E-02	8.603897	.7385E+06
.32	.4030E-02	8.664393	.7447E+06
.33	.4026E-02	8.716863	.7503E+06
.34	.4023E-02	8.761666	.7551E+06
.35	.4021E-02	8.799151	.7594E+06
.36	.4019E-02	8.829655	.7630E+06
.37	.4016E-02	8.853498	.7661E+06
.38	.4013E-02	8.870991	.7686E+06
.39	.4011E-02	8.882435	.7706E+06
.40	.4010E-02	8.888117	.7721E+06
.41	.4008E-02	8.888317	.7732E+06
.42	.4006E-02	8.883301	.7738E+06
.43	.4005E-02	8.873326	.7739E+06
.44	.4002E-02	8.858641	.7737E+06
.45	.4000E-02	8.839482	.7731E+06
.46	.4000E-02	8.816082	.7721E+06
.47	.3997E-02	8.788659	.7708E+06
.48	.3997E-02	8.757427	.7691E+06
.49	.3994E-02	8.722589	.7672E+06
.50	.3996E-02	8.684341	.7649E+06

VREME (1.E-6)	POJACANJE (1/cm)	KONC.ELEKTRONA (1.E+12 1/cm ³)	IZL. SNAGA (W)
.51	.3993E-02	8.642873	.7624E+06
.52	.3992E-02	8.598366	.7596E+06
.53	.3990E-02	8.550995	.7565E+06
.54	.3989E-02	8.500925	.7532E+06
.55	.3988E-02	8.448320	.7497E+06
.56	.3988E-02	8.393332	.7460E+06
.57	.3986E-02	8.336113	.7421E+06
.58	.3985E-02	8.276801	.7381E+06
.59	.3984E-02	8.215536	.7338E+06
.60	.3985E-02	8.152448	.7294E+06
.61	.3984E-02	8.087663	.7248E+06
.62	.3982E-02	8.021301	.7201E+06
.63	.3982E-02	7.953479	.7153E+06
.64	.3981E-02	7.884308	.7103E+06
.65	.3981E-02	7.813894	.7052E+06
.66	.3979E-02	7.742339	.7000E+06
.67	.3979E-02	7.669739	.6947E+06
.68	.3977E-02	7.596189	.6893E+06
.69	.3978E-02	7.521780	.6839E+06
.70	.3977E-02	7.446595	.6783E+06
.71	.3977E-02	7.370716	.6726E+06
.72	.3975E-02	7.294222	.6669E+06
.73	.3976E-02	7.217189	.6611E+06
.74	.3975E-02	7.139686	.6553E+06
.75	.3975E-02	7.061783	.6494E+06
.76	.3973E-02	6.983545	.6435E+06
.77	.3973E-02	6.905034	.6375E+06
.78	.3972E-02	6.826309	.6315E+06
.79	.3974E-02	6.747427	.6255E+06
.80	.3971E-02	6.668440	.6194E+06
.81	.3972E-02	6.589403	.6134E+06
.82	.3972E-02	6.510362	.6073E+06
.83	.3970E-02	6.431365	.6012E+06
.84	.3971E-02	6.352454	.5950E+06
.85	.3970E-02	6.273673	.5889E+06
.86	.3971E-02	6.195061	.5828E+06
.87	.3969E-02	6.116656	.5766E+06
.88	.3969E-02	6.038494	.5705E+06
.89	.3969E-02	5.960608	.5643E+06
.90	.3969E-02	5.883032	.5582E+06
.91	.3967E-02	5.805794	.5521E+06
.92	.3967E-02	5.728925	.5460E+06
.93	.3966E-02	5.652451	.5399E+06
.94	.3967E-02	5.576396	.5338E+06
.95	.3967E-02	5.500787	.5278E+06
.96	.3966E-02	5.425645	.5217E+06
.97	.3965E-02	5.350991	.5157E+06
.98	.3966E-02	5.276845	.5097E+06
.99	.3964E-02	5.203227	.5037E+06
1.00	.3966E-02	5.130152	.4978E+06

VREME (1.E-6)	POJACANJE (1/cm)	KONC. ELEKTRONA (1.E+12 1/cm ³)	IZL. SNAGA (W)
1.01	.3965E-02	5.057638	.4919E+06
1.02	.3965E-02	4.985699	.4860E+06
1.03	.3964E-02	4.914351	.4801E+06
1.04	.3964E-02	4.843606	.4743E+06
1.05	.3965E-02	4.773474	.4685E+06
1.06	.3964E-02	4.703969	.4628E+06
1.07	.3963E-02	4.635099	.4570E+06
1.08	.3963E-02	4.566875	.4514E+06
1.09	.3964E-02	4.499305	.4457E+06
1.10	.3963E-02	4.432397	.4401E+06
1.11	.3962E-02	4.366157	.4345E+06
1.12	.3962E-02	4.300591	.4290E+06
1.13	.3961E-02	4.235705	.4235E+06
1.14	.3963E-02	4.171505	.4181E+06
1.15	.3960E-02	4.107993	.4127E+06
1.16	.3961E-02	4.045174	.4073E+06
1.17	.3962E-02	3.983051	.4020E+06
1.18	.3961E-02	3.921626	.3967E+06
1.19	.3961E-02	3.860901	.3915E+06
1.20	.3961E-02	3.800877	.3863E+06
1.21	.3960E-02	3.741555	.3812E+06
1.22	.3960E-02	3.682937	.3761E+06
1.23	.3961E-02	3.625021	.3710E+06
1.24	.3960E-02	3.567808	.3660E+06
1.25	.3960E-02	3.511297	.3611E+06
1.26	.3960E-02	3.455486	.3562E+06
1.27	.3960E-02	3.400374	.3513E+06
1.28	.3959E-02	3.345960	.3465E+06
1.29	.3958E-02	3.292241	.3417E+06
1.30	.3958E-02	3.239214	.3370E+06
1.31	.3958E-02	3.186877	.3323E+06
1.32	.3958E-02	3.135228	.3277E+06
1.33	.3958E-02	3.084262	.3232E+06
1.34	.3959E-02	3.033976	.3187E+06
1.35	.3958E-02	2.984367	.3142E+06
1.36	.3958E-02	2.935430	.3098E+06
1.37	.3957E-02	2.887161	.3054E+06
1.38	.3957E-02	2.839557	.3011E+06
1.39	.3957E-02	2.792612	.2968E+06
1.40	.3958E-02	2.746321	.2926E+06
1.41	.3956E-02	2.700681	.2884E+06
1.42	.3957E-02	2.655686	.2843E+06
1.43	.3957E-02	2.611331	.2802E+06
1.44	.3957E-02	2.567610	.2761E+06
1.45	.3957E-02	2.524518	.2721E+06
1.46	.3955E-02	2.482051	.2682E+06
1.47	.3955E-02	2.440201	.2643E+06
1.48	.3955E-02	2.398964	.2604E+06
1.49	.3955E-02	2.358335	.2566E+06
1.50	.3955E-02	2.318305	.2528E+06

VREME (1.E-6)	POJACANJE (1/cm)	KONC. ELEKTRONA (1.E+12 1/cm ³)	IZL. SNAGA (W)
1.51	.3956E-02	2.278872	.2491E+06
1.52	.3956E-02	2.240027	.2454E+06
1.53	.3955E-02	2.201766	.2418E+06
1.54	.3955E-02	2.164082	.2382E+06
1.55	.3955E-02	2.126969	.2346E+06
1.56	.3955E-02	2.090421	.2311E+06
1.57	.3955E-02	2.054432	.2277E+06
1.58	.3954E-02	2.018996	.2242E+06
1.59	.3955E-02	1.984105	.2209E+06
1.60	.3954E-02	1.949755	.2175E+06
1.61	.3954E-02	1.915939	.2142E+06
1.62	.3955E-02	1.882651	.2110E+06
1.63	.3955E-02	1.849884	.2078E+06
1.64	.3954E-02	1.817633	.2046E+06
1.65	.3954E-02	1.785890	.2015E+06
1.66	.3954E-02	1.754650	.1984E+06
1.67	.3955E-02	1.723907	.1953E+06
1.68	.3954E-02	1.693654	.1923E+06
1.69	.3953E-02	1.663885	.1893E+06
1.70	.3953E-02	1.634593	.1864E+06
1.71	.3953E-02	1.605774	.1835E+06
1.72	.3953E-02	1.577420	.1806E+06
1.73	.3952E-02	1.549526	.1778E+06
1.74	.3952E-02	1.522085	.1750E+06
1.75	.3952E-02	1.495092	.1723E+06
1.76	.3953E-02	1.468539	.1696E+06
1.77	.3952E-02	1.442422	.1670E+06
1.78	.3953E-02	1.416735	.1644E+06
1.79	.3952E-02	1.391471	.1618E+06
1.80	.3953E-02	1.366625	.1593E+06
1.81	.3952E-02	1.342190	.1568E+06
1.82	.3952E-02	1.318162	.1543E+06
1.83	.3953E-02	1.294533	.1519E+06
1.84	.3952E-02	1.271300	.1495E+06
1.85	.3951E-02	1.248455	.1471E+06
1.86	.3953E-02	1.225994	.1448E+06
1.87	.3953E-02	1.203911	.1425E+06
1.88	.3951E-02	1.182200	.1402E+06
1.89	.3952E-02	1.160856	.1380E+06
1.90	.3951E-02	1.139873	.1358E+06
1.91	.3952E-02	1.119246	.1336E+06
1.92	.3951E-02	1.098970	.1315E+06
1.93	.3951E-02	1.079040	.1294E+06
1.94	.3951E-02	1.059451	.1273E+06
1.95	.3952E-02	1.040196	.1252E+06
1.96	.3951E-02	1.021272	.1232E+06
1.97	.3951E-02	1.002672	.1212E+06
1.98	.3950E-02	.984393	.1193E+06
1.99	.3950E-02	.966430	.1173E+06
2.00	.3950E-02	.948776	.1154E+06

VREME (1.E-6)	POJACANJE (1/cm)	KONC. ELEKTRONA (1.E+12 1/cm ³)	IZL. SNAGA (W)
2.01	.3951E-02	.931429	.1135E+06
2.02	.3950E-02	.914382	.1117E+06
2.03	.3950E-02	.897631	.1099E+06
2.04	.3951E-02	.881172	.1081E+06
2.05	.3950E-02	.865000	.1063E+06
2.06	.3950E-02	.849110	.1045E+06
2.07	.3950E-02	.833498	.1028E+06
2.08	.3950E-02	.818160	.1011E+06
2.09	.3949E-02	.803091	.9946E+05
2.10	.3950E-02	.788286	.9782E+05
2.11	.3949E-02	.773743	.9620E+05
2.12	.3950E-02	.759455	.9460E+05
2.13	.3949E-02	.745420	.9303E+05
2.14	.3950E-02	.731633	.9148E+05
2.15	.3950E-02	.718091	.8996E+05
2.16	.3948E-02	.704788	.8845E+05
2.17	.3949E-02	.691722	.8697E+05
2.18	.3949E-02	.678888	.8552E+05
2.19	.3948E-02	.666282	.8408E+05
2.20	.3948E-02	.653902	.8267E+05
2.21	.3950E-02	.641742	.8128E+05
2.22	.3950E-02	.629800	.7994E+05
2.23	.3949E-02	.618072	.7863E+05
2.24	.3949E-02	.606553	.7733E+05
2.25	.3950E-02	.595242	.7605E+05
2.26	.3949E-02	.584134	.7480E+05
2.27	.3950E-02	.573225	.7356E+05
2.28	.3949E-02	.562514	.7234E+05
2.29	.3949E-02	.551995	.7114E+05
2.30	.3949E-02	.541666	.6996E+05
2.31	.3949E-02	.531524	.6880E+05
2.32	.3949E-02	.521565	.6765E+05
2.33	.3949E-02	.511787	.6652E+05
2.34	.3949E-02	.502186	.6541E+05
2.35	.3949E-02	.492760	.6432E+05
2.36	.3948E-02	.483505	.6325E+05
2.37	.3950E-02	.474418	.6219E+05
2.38	.3949E-02	.465496	.6114E+05
2.39	.3948E-02	.456738	.6012E+05
2.40	.3948E-02	.448139	.5911E+05
2.41	.3948E-02	.439697	.5811E+05
2.42	.3949E-02	.431409	.5714E+05
2.43	.3949E-02	.423273	.5617E+05
2.44	.3948E-02	.415287	.5522E+05
2.45	.3949E-02	.407446	.5429E+05
2.46	.3949E-02	.399750	.5337E+05
2.47	.3949E-02	.392195	.5247E+05
2.48	.3949E-02	.384778	.5158E+05
2.49	.3948E-02	.377499	.5070E+05
2.50	.3948E-02	.370353	.4984E+05

VREME (1.E-6)	POJACANJE (1/cm)	KONC. ELEKTRONA (1.E+12 1/cm ³)	IZL. SNAGA (W)
2.51	.3948E-02	.363339	.4900E+05
2.52	.3948E-02	.356455	.4816E+05
2.53	.3949E-02	.349697	.4734E+05
2.54	.3948E-02	.343065	.4653E+05
2.55	.3947E-02	.336555	.4574E+05
2.56	.3947E-02	.330166	.4495E+05
2.57	.3948E-02	.323895	.4418E+05
2.58	.3947E-02	.317740	.4342E+05
2.59	.3947E-02	.311699	.4268E+05
2.60	.3948E-02	.305771	.4195E+05
2.61	.3947E-02	.299953	.4122E+05
2.62	.3947E-02	.294243	.4051E+05
2.63	.3948E-02	.288639	.3981E+05
2.64	.3947E-02	.283139	.3913E+05
2.65	.3947E-02	.277742	.3845E+05
2.66	.3947E-02	.272446	.3778E+05
2.67	.3947E-02	.267249	.3713E+05
2.68	.3946E-02	.262148	.3648E+05
2.69	.3948E-02	.257143	.3585E+05
2.70	.3947E-02	.252232	.3522E+05
2.71	.3947E-02	.247412	.3461E+05
2.72	.3947E-02	.242683	.3401E+05
2.73	.3947E-02	.238042	.3341E+05
2.74	.3947E-02	.233488	.3283E+05
2.75	.3946E-02	.229020	.3225E+05
2.76	.3946E-02	.224635	.3169E+05
2.77	.3946E-02	.220333	.3113E+05
2.78	.3947E-02	.216112	.3058E+05
2.79	.3946E-02	.211970	.3004E+05
2.80	.3946E-02	.207906	.2951E+05
2.81	.3946E-02	.203919	.2899E+05
2.82	.3946E-02	.200006	.2848E+05
2.83	.3946E-02	.196168	.2797E+05
2.84	.3946E-02	.192401	.2748E+05
2.85	.3946E-02	.188706	.2699E+05
2.86	.3945E-02	.185081	.2651E+05
2.87	.3946E-02	.181524	.2603E+05
2.88	.3945E-02	.178034	.2557E+05
2.89	.3945E-02	.174611	.2511E+05
2.90	.3945E-02	.171252	.2466E+05
2.91	.3946E-02	.167956	.2422E+05
2.92	.3945E-02	.164724	.2378E+05
2.93	.3945E-02	.161552	.2335E+05
2.94	.3945E-02	.158440	.2293E+05
2.95	.3945E-02	.155388	.2252E+05
2.96	.3944E-02	.152393	.2211E+05
2.97	.3944E-02	.149455	.2171E+05
2.98	.3944E-02	.146573	.2132E+05
2.99	.3944E-02	.143746	.2093E+05
3.00	.3947E-02	.140973	.2055E+05

VREME (1.E-6)	POJACANJE (1/cm)	KONC.ELEKTRONA (1.E+12 1/cm ³)	IZL. SNAGA (W)
3.01	.3950E-02	.138252	.2021E+05
3.02	.3951E-02	.135583	.1988E+05
3.03	.3951E-02	.132965	.1955E+05
3.04	.3951E-02	.130397	.1923E+05
3.05	.3950E-02	.127877	.1891E+05
3.06	.3950E-02	.125406	.1860E+05
3.07	.3950E-02	.122982	.1830E+05
3.08	.3950E-02	.120604	.1799E+05
3.09	.3950E-02	.118271	.1770E+05
3.10	.3950E-02	.115983	.1741E+05
3.11	.3950E-02	.113739	.1712E+05
3.12	.3950E-02	.111538	.1684E+05
3.13	.3950E-02	.109378	.1656E+05
3.14	.3950E-02	.107260	.1629E+05
3.15	.3950E-02	.105183	.1602E+05
3.16	.3950E-02	.103145	.1576E+05
3.17	.3950E-02	.101146	.1550E+05
3.18	.3949E-02	.099186	.1524E+05
3.19	.3951E-02	.097263	.1499E+05
3.20	.3950E-02	.095377	.1474E+05
3.21	.3950E-02	.093527	.1450E+05
3.22	.3950E-02	.091712	.1426E+05
3.23	.3949E-02	.089933	.1403E+05
3.24	.3950E-02	.088187	.1380E+05
3.25	.3950E-02	.086475	.1357E+05
3.26	.3950E-02	.084796	.1334E+05
3.27	.3951E-02	.083149	.1313E+05
3.28	.3950E-02	.081534	.1291E+05
3.29	.3950E-02	.079950	.1270E+05
3.30	.3950E-02	.078396	.1249E+05
3.31	.3950E-02	.076872	.1228E+05
3.32	.3950E-02	.075378	.1208E+05
3.33	.3950E-02	.073912	.1188E+05
3.34	.3950E-02	.072475	.1169E+05
3.35	.3949E-02	.071065	.1149E+05
3.36	.3950E-02	.069682	.1131E+05
3.37	.3949E-02	.068326	.1112E+05
3.38	.3950E-02	.066997	.1094E+05
3.39	.3950E-02	.065692	.1076E+05
3.40	.3950E-02	.064413	.1058E+05
3.41	.3949E-02	.063159	.1041E+05
3.42	.3950E-02	.061929	.1024E+05
3.43	.3950E-02	.060722	.1007E+05
3.44	.3950E-02	.059539	9904.
3.45	.3951E-02	.058379	9741.
3.46	.3951E-02	.057241	9581.
3.47	.3950E-02	.056125	9424.
3.48	.3950E-02	.055031	9270.
3.49	.3950E-02	.053958	9118.
3.50	.3950E-02	.052906	8969.

VREME (1.E-6)	POJACANJE (1/cm)	KONC.ELEKTRONA (1.E+12 1/cm ³)	IZL. SNAGA (W)
3.51	.3951E-02	.051874	8822.
3.52	.3950E-02	.050862	8677.
3.53	.3950E-02	.049869	8535.
3.54	.3950E-02	.048896	8396.
3.55	.3950E-02	.047941	8258.
3.56	.3950E-02	.047006	8123.
3.57	.3951E-02	.046088	7991.
3.58	.3951E-02	.045188	7860.
3.59	.3950E-02	.044305	7732.
3.60	.3950E-02	.043440	7605.
3.61	.3950E-02	.042591	7481.
3.62	.3951E-02	.041759	7359.
3.63	.3950E-02	.040943	7239.
3.64	.3951E-02	.040143	7121.
3.65	.3951E-02	.039358	7005.
3.66	.3950E-02	.038589	6891.
3.67	.3950E-02	.037834	6779.
3.68	.3951E-02	.037094	6668.
3.69	.3950E-02	.036369	6560.
3.70	.3951E-02	.035657	6453.
3.71	.3950E-02	.034960	6348.
3.72	.3951E-02	.034276	6245.
3.73	.3951E-02	.033605	6144.
3.74	.3950E-02	.032947	6044.
3.75	.3951E-02	.032302	5946.
3.76	.3950E-02	.031670	5849.
3.77	.3951E-02	.031050	5754.
3.78	.3951E-02	.030442	5661.
3.79	.3951E-02	.029846	5569.
3.80	.3951E-02	.029261	5479.
3.81	.3951E-02	.028688	5391.
3.82	.3951E-02	.028126	5303.
3.83	.3951E-02	.027575	5218.
3.84	.3950E-02	.027035	5133.
3.85	.3951E-02	.026505	5050.
3.86	.3951E-02	.025986	4969.
3.87	.3950E-02	.025476	4889.
3.88	.3951E-02	.024977	4810.
3.89	.3951E-02	.024487	4732.
3.90	.3951E-02	.024007	4656.
3.91	.3952E-02	.023536	4581.
3.92	.3951E-02	.023075	4508.
3.93	.3951E-02	.022622	4435.
3.94	.3951E-02	.022179	4364.
3.95	.3951E-02	.021744	4294.
3.96	.3951E-02	.021317	4225.
3.97	.3952E-02	.020899	4157.
3.98	.3951E-02	.020489	4090.
3.99	.3951E-02	.020087	4025.
4.00	.3951E-02	.019692	3961.

VREME (1.E-6)	POJACANJE (1/cm)	KONC. ELEKTRONA (1.E+12 1/cm ³)	IZL. SNAGA (W)
4.01	.3952E-02	.019306	3897.
4.02	.3952E-02	.018927	3835.
4.03	.3951E-02	.018555	3774.
4.04	.3951E-02	.018191	3713.
4.05	.3952E-02	.017834	3654.
4.06	.3952E-02	.017484	3596.
4.07	.3952E-02	.017140	3539.
4.08	.3952E-02	.016804	3483.
4.09	.3952E-02	.016473	3427.
4.10	.3952E-02	.016150	3373.
4.11	.3952E-02	.015833	3319.
4.12	.3952E-02	.015522	3267.
4.13	.3952E-02	.015217	3215.
4.14	.3952E-02	.014918	3164.
4.15	.3951E-02	.014624	3114.
4.16	.3952E-02	.014337	3065.
4.17	.3952E-02	.014055	3016.
4.18	.3952E-02	.013779	2969.
4.19	.3952E-02	.013508	2922.
4.20	.3953E-02	.013242	2876.
4.21	.3952E-02	.012982	2831.
4.22	.3952E-02	.012727	2786.
4.23	.3952E-02	.012476	2742.
4.24	.3952E-02	.012231	2699.
4.25	.3952E-02	.011991	2657.
4.26	.3952E-02	.011755	2615.
4.27	.3952E-02	.011523	2575.
4.28	.3953E-02	.011297	2534.
4.29	.3954E-02	.011075	2495.
4.30	.3953E-02	.010857	2456.
4.31	.3953E-02	.010643	2418.
4.32	.3953E-02	.010434	2380.
4.33	.3954E-02	.010228	2343.
4.34	.3953E-02	.010027	2307.
4.35	.3953E-02	.009830	2271.
4.36	.3953E-02	.009636	2236.
4.37	.3953E-02	.009447	2201.
4.38	.3953E-02	.009261	2167.
4.39	.3954E-02	.009078	2134.
4.40	.3954E-02	.008900	2101.
4.41	.3953E-02	.008724	2069.
4.42	.3953E-02	.008553	2037.
4.43	.3954E-02	.008384	2005.
4.44	.3954E-02	.008219	1975.
4.45	.3955E-02	.008057	1944.
4.46	.3953E-02	.007898	1915.
4.47	.3954E-02	.007743	1886.
4.48	.3954E-02	.007590	1857.
4.49	.3954E-02	.007441	1829.
4.50	.3954E-02	.007294	1801.

VREME (1.E-6)	POJACANJE (1/cm)	KONC. ELEKTRONA (1.E+12 1/cm ³)	IZL. SNAGA (W)
4.51	.3954E-02	.007151	1773.
4.52	.3954E-02	.007010	1746.
4.53	.3955E-02	.006872	1720.
4.54	.3954E-02	.006736	1694.
4.55	.3954E-02	.006603	1668.
4.56	.3955E-02	.006473	1643.
4.57	.3954E-02	.006346	1619.
4.58	.3955E-02	.006221	1594.
4.59	.3955E-02	.006098	1570.
4.60	.3955E-02	.005978	1547.
4.61	.3956E-02	.005860	1524.
4.62	.3955E-02	.005745	1501.
4.63	.3955E-02	.005631	1479.
4.64	.3955E-02	.005520	1457.
4.65	.3956E-02	.005411	1435.
4.66	.3956E-02	.005305	1414.
4.67	.3956E-02	.005200	1393.
4.68	.3956E-02	.005098	1372.
4.69	.3956E-02	.004997	1352.
4.70	.3956E-02	.004899	1332.
4.71	.3956E-02	.004802	1313.
4.72	.3955E-02	.004707	1293.
4.73	.3956E-02	.004614	1275.
4.74	.3956E-02	.004523	1256.
4.75	.3956E-02	.004434	1238.
4.76	.3956E-02	.004347	1220.
4.77	.3956E-02	.004261	1202.
4.78	.3957E-02	.004177	1185.
4.79	.3957E-02	.004095	1168.
4.80	.3957E-02	.004014	1151.
4.81	.3957E-02	.003935	1134.
4.82	.3957E-02	.003857	1118.
4.83	.3957E-02	.003781	1102.
4.84	.3957E-02	.003706	1086.
4.85	.3958E-02	.003633	1071.
4.86	.3957E-02	.003561	1056.
4.87	.3958E-02	.003491	1041.
4.88	.3958E-02	.003422	1026.
4.89	.3958E-02	.003355	1011.
4.90	.3958E-02	.003288	997.2
4.91	.3958E-02	.003224	983.2
4.92	.3959E-02	.003160	969.4
4.93	.3958E-02	.003098	955.9
4.94	.3958E-02	.003036	942.6
4.95	.3959E-02	.002976	929.5
4.96	.3959E-02	.002918	916.6
4.97	.3959E-02	.002860	903.9
4.98	.3959E-02	.002804	891.5
4.99	.3959E-02	.002748	879.3
5.00	.3959E-02	.002694	867.2

VREME (1.E-6)	POJACANJE (1/cm)	KONC. ELEKTRONA (1.E+12 1/cm ³)	IZL. SNAGA (W)
5.01	.3959E-02	.002641	855.4
5.02	.3959E-02	.002589	843.7
5.03	.3959E-02	.002538	832.3
5.04	.3960E-02	.002487	821.0
5.05	.3960E-02	.002438	809.9
5.06	.3960E-02	.002390	799.1
5.07	.3960E-02	.002343	788.3
5.08	.3960E-02	.002297	777.8
5.09	.3960E-02	.002251	767.5
5.10	.3960E-02	.002207	757.3
5.11	.3960E-02	.002163	747.2
5.12	.3960E-02	.002121	737.4
5.13	.3962E-02	.002079	727.7
5.14	.3961E-02	.002038	718.2
5.15	.3962E-02	.001997	708.8
5.16	.3961E-02	.001958	699.6
5.17	.3961E-02	.001919	690.5
5.18	.3962E-02	.001881	681.6
5.19	.3962E-02	.001844	672.8
5.20	.3962E-02	.001808	664.2
5.21	.3963E-02	.001772	655.7
5.22	.3963E-02	.001737	647.4
5.23	.3963E-02	.001703	639.2
5.24	.3963E-02	.001669	631.1
5.25	.3963E-02	.001636	623.2
5.26	.3964E-02	.001604	615.4
5.27	.3963E-02	.001572	607.7
5.28	.3964E-02	.001541	600.1
5.29	.3963E-02	.001511	592.7
5.30	.3964E-02	.001481	585.4
5.31	.3964E-02	.001451	578.2
5.32	.3964E-02	.001423	571.2
5.33	.3965E-02	.001395	564.2
5.34	.3964E-02	.001367	557.4
5.35	.3965E-02	.001340	550.7
5.36	.3966E-02	.001314	544.1
5.37	.3964E-02	.001288	537.6
5.38	.3965E-02	.001262	531.2
5.39	.3966E-02	.001237	524.9
5.40	.3965E-02	.001213	518.7
5.41	.3966E-02	.001189	512.7
5.42	.3966E-02	.001165	506.7
5.43	.3967E-02	.001142	500.8
5.44	.3966E-02	.001120	495.0
5.45	.3966E-02	.001098	489.3
5.46	.3967E-02	.001076	483.7
5.47	.3967E-02	.001055	478.2
5.48	.3968E-02	.001034	472.8
5.49	.3966E-02	.001013	467.5
5.50	.3968E-02	.000993	462.3

VREME (1.E-6)	POJACANJE (1/cm)	KONC. ELEKTRONA (1.E+12 1/cm ³)	IZL. SNAGA (W)
5.51	.3968E-02	.000974	457.1
5.52	.3968E-02	.000954	452.1
5.53	.3968E-02	.000936	447.1
5.54	.3968E-02	.000917	442.2
5.55	.3968E-02	.000899	437.4
5.56	.3969E-02	.000881	432.6
5.57	.3968E-02	.000864	428.0
5.58	.3969E-02	.000847	423.4
5.59	.3970E-02	.000830	418.9
5.60	.3969E-02	.000813	414.5
5.61	.3969E-02	.000797	410.1
5.62	.3970E-02	.000782	405.8
5.63	.3970E-02	.000766	401.6
5.64	.3969E-02	.000751	397.4
5.65	.3970E-02	.000736	393.4
5.66	.3971E-02	.000722	389.4
5.67	.3971E-02	.000707	385.4
5.68	.3972E-02	.000693	381.5
5.69	.3972E-02	.000680	377.7
5.70	.3972E-02	.000666	374.0
5.71	.3972E-02	.000653	370.3
5.72	.3972E-02	.000640	366.6
5.73	.3973E-02	.000627	363.1
5.74	.3972E-02	.000615	359.6
5.75	.3973E-02	.000603	356.1
5.76	.3973E-02	.000591	352.7
5.77	.3973E-02	.000579	349.4
5.78	.3974E-02	.000568	346.1
5.79	.3974E-02	.000557	342.8
5.80	.3974E-02	.000546	339.7
5.81	.3973E-02	.000535	336.5
5.82	.3975E-02	.000524	333.5
5.83	.3974E-02	.000514	330.4
5.84	.3975E-02	.000504	327.5
5.85	.3975E-02	.000494	324.5
5.86	.3975E-02	.000484	321.7
5.87	.3976E-02	.000474	318.8
5.88	.3976E-02	.000465	316.0
5.89	.3975E-02	.000456	313.3
5.90	.3976E-02	.000447	310.6
5.91	.3977E-02	.000438	308.0
5.92	.3977E-02	.000429	305.4
5.93	.3977E-02	.000421	302.8
5.94	.3978E-02	.000412	300.3
5.95	.3977E-02	.000404	297.8
5.96	.3978E-02	.000396	295.4
5.97	.3977E-02	.000388	293.0
5.98	.3978E-02	.000381	290.6
5.99	.3978E-02	.000373	288.3
6.00	.3979E-02	.000366	286.0

