

OUTPUT FROM THE FOKKER-PLANCK CODE CQL3D.

FOR QUESTIONS CONTACT

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CQL3D IS A PRODUCT OF NERSC/GA/EPFL/CompX  
COLLABORATION.

DATE/TIME is 2024/09/25 11:50 24.197s

MACHINE:

Linux node500 3.10.0–514.26.2.el7.x86\_64 #1 SMP Tue Jul 4 15  
:04:05 UTC 2017 x86\_64 x86\_64 x86\_64 GNU

PWD:

/home/vandelijs/HFW\_147634/scan\_matrix\_npar\_beam\_5\_rf\_0\_7/npa  
r\_1

CQL3D VERSION: cql3d\_git\_210125.1

PGPLOT VERSION: v5.2.2

```

&setup0
ibox = 'box g35'
iuser = 'vandelij'
ioutput = 6
lrz = 55
noplots = 'enabled'
mnemonic = 'cql3d'
nlwritf = 'ncdfdist'
nlrestrt = 'disabled'
&end

&setup
acoefne = -1.8 -7.83 51.57 -353.68
acoefte = 8.01 -13.6 8.69 -114.59
bnumb(1) = 1.0
bnumb(2) = -1.0
bnumb(3) = 1.0
bnumb(4) = -1.0
bootst = 'disabled'
chang = 'noneg'
colmodl = 0
contrmin = 1e-12
dtr = 0.004 !0.001
dtr1(1) = 0.010,0.010 ! larger time step =dtr1 after nondtr
1=50
nondtr1(1)= 50,100
eegy(1,1,1,1) = 0.0
eegy(1,2,1,1) = 2.0
eegy(2,1,1,1) = 0.0
eegy(2,2,1,1) = 6.0
elecfld(0) = 0.0
elecfld(1) = 0.0
enloss(1) = 200.0
enmin = 10
enmax = 250
tandem = 'enabled'
enormi = 3250 !keV !If no losses, the tail can be large, u
se enorm=1e4
enorme = 300 ! 5000 TODO: changed this
eoved = 0.0
ephicc = 1.0
fds = 0.2
fmass(1) = 3.3435834581040974e-24
fmass(2) = 9.1095e-28
fmass(3) = 3.3435834581040974e-24
fmass(4) = 9.1095e-28
gamaset = 17
gsla = 270.0
gslb = 35.0

```

```

iactst = 'enabled'
idskf = 'disabled'
idskrf = 'disabled'
implct = 'enabled'
ineg = 'trunc_d' !'enabled' !This has large effect on results
iproelec = 'parabola'
iprone = 'spline'
iprote = 'spline'
iproti = 'spline'
iprozeff = 'parabola'
irzplt(1) = 5 !rho=0.18
irzplt(2) = 7 !rho=0.22
irzplt(3) = 8 !rho=0.23
irzplt(4) = 9 !rho=0.24
iy = 240 !254
izeff = 'ion'
jx = 500
kfrsou = 1
kpress(3) = 'enabled'
kspeci(1,1) = 'D'
kspeci(2,1) = 'general'
kspeci(1,2) = 'e'
kspeci(2,2) = 'general'
kspeci(1,3) = 'D'
kspeci(2,3) = 'maxwell'
kspeci(1,4) = 'e'
kspeci(2,4) = 'maxwell'
lbdry(1) = 'conscalm'
lbdry(2) = 'conscalm' ! TODO delete this
locquas = 'disabled'
lossmode(1)='simplban' !'disabled' !With losses, enorm can
be reduced
lz = 80
machine = 'toroidal'
manymat = 'disabled'
meshy = 'fixed_y'
mpwr = 0.1, 1.0, 1.0, 1.0,
mx = 3
nchec = 1
ncoef = 1
ncont = 20
nen = 120
netcdfnm = 'LH_CMOD.nc'
ngen = 2
njene = 51
nmax = 2
noffel = 10000
! nondtr1 = -1 !see above, near dtr1

```

```

nonel = 0
nplot = 100
nplt3d = 100 ! 30
npwr = 2.0 2.0 2.0 2.0
nrskip = 0
nrstrt = 1
nstop = 200
nstps = 100 ! for taunew="enabled" only
numby = 30
nv = 66
partner = 'bramb'
plt3d = 'enabled'
pltd = 'enabled'
pltdn = 'disabled'
pltend = 'enabled'
pltfvs = 'enabled'
pltinput = 'enabled'
pltmag = 1.0
pltsig = 'enabled'
pltpowe = 'last'
pltprpp = 'disabled'
pltrst = 'disabled'
pltstrm = 'disabled'
pltvecal = 'disabled'
pltvecc = 'disabled'
pltvece = 'disabled'
pltvecrf = 'disabled'
pltvflu = 'disabled'
pltvs = 'rho'
profpsi = 'disabled'
psimodel = 'spline'
qsineut = 'disabled'
radmaj = 177.7
radmin = 67
rd = 40.0
radcoord = "sqtorflx"
relativ = 'enabled'
rfacz = 1
rmirror = 7.5
rovera = 1e-06
roveram = 0.0
rya(1)= 0.01 0.02814815 0.0462963 0.06444444 0.08259259 0.
10074074
0.11888889 0.13703704 0.15518519 0.17333333 0.19148148 0.20
962963
0.22777778 0.24592593 0.26407407 0.28222222 0.30037037 0.31
851852
0.33666667 0.35481481 0.37296296 0.39111111 0.40925926 0.42
740741

```

```

0.44555556 0.4637037 0.48185185 0.5      0.51814815 0.53
62963
0.55444444 0.57259259 0.59074074 0.60888889 0.62703704 0.64
518519
0.66333333 0.68148148 0.69962963 0.71777778 0.73592593 0.75
407407
0.77222222 0.79037037 0.80851852 0.82666667 0.84481481 0.86
296296
0.88111111 0.89925926 0.91740741 0.93555556 0.9537037 0.97
185185
0.99
rzset = 'enabled'
! softxry = 'enabled'
syncrad = 'disabled'
tauloss(1,1) = 0.3
tauloss(2,1) = 0.0
tauloss(3,1) = 0.0
tbnd = 0.002
tfac = 1
tfacz = 1.0
thet1 = 105.73, 101.81, 97.78, 93.67, 89.52, 85.38, 81.28,
77.28, 73.39, 108.0,
104.08, 100.02, 95.86, 91.63, 87.39, 83.17, 79.03, 75.0
, 71.12, 106.35, 102.29,
98.1, 93.82, 89.5, 85.19, 80.92, 76.76, 72.74, 108.58,
104.55, 100.36, 96.06,
91.69, 87.3, 82.94, 78.66, 74.51, 70.51, 106.76, 102.61
, 98.32, 93.93, 89.49,
85.06, 80.69, 76.42, 72.3, 108.9, 104.8, 100.55, 96.17,
91.72, 87.25, 82.81,
78.46, 74.24, 70.19, 106.91, 102.72, 98.39, 93.96, 89.4
8, 85.01, 80.6, 76.3,
72.15,
thet2 = 133.8, 133.8, 133.8, 133.8, 133.8, 133.8, 133.8, 1
33.8, 133.8, 137.21,
137.21, 137.21, 137.21, 137.21, 137.21, 137.21, 137.21,
137.21, 137.21, 140.76,
140.76, 140.76, 140.76, 140.76, 140.76, 140.76, 140.76,
140.76, 144.43, 144.43,
144.43, 144.43, 144.43, 144.43, 144.43, 144.43, 144.43,
144.43, 148.2, 148.2,
148.2, 148.2, 148.2, 148.2, 148.2, 148.2, 148.2, 152.05
, 152.05, 152.05, 152.05,
152.05, 152.05, 152.05, 152.05, 152.05, 152.05, 155.92,
155.92, 155.92, 155.92,
155.92, 155.92, 155.92, 155.92, 155.92,
torloss(1) = 'disabled'
torloss(2) = 'disabled' ! TODO delete this
veclnth = 1.5

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```

xfac = 0.5
xlwr = 0.085
xmdl = 0.25
xpctlwr = 0.1
xpctmdl = 0.4
ylower = 1.22
yreset = 'disabled'
yupper = 1.275
zmax = 408.0
x_sxr = 293.204
z_sxr = 0.0
! elecin(1) = -9.56741e-05, -0.000109526, -0.000147339, -0.
000198782,
!      -0.000251971, -0.000300431, -0.000342281, -0.000373012
!, -0.000387655,
!      -0.000385237, -0.000371319,
ryain = 0.0, 0.02, 0.04, 0.06, 0.08, 0.1, 0.12, 0.14, 0.16
, 0.18, 0.2, 0.22, 0.24,
      0.26, 0.28, 0.3, 0.32, 0.34, 0.36, 0.38, 0.4, 0.42, 0.4
4, 0.46, 0.48, 0.5, 0.52,
      0.54, 0.56, 0.58, 0.6, 0.62, 0.64, 0.66, 0.68, 0.7, 0.7
2, 0.74, 0.76, 0.78, 0.8,
      0.82, 0.84, 0.86, 0.88, 0.9, 0.92, 0.94, 0.96, 0.98, 1.
0,
enein(1,1) = 6000000000000.0, 59962941237520.016, 5986725
0566342.87,
      59703838452127.08, 59485184853022.37, 59205556569110.03
,
      58872591209671.39, 58485106557533.81, 58045531370610.30
5,
      57558573577903.8, 57020188242888.29, 56438639988791.0,
55813573292710.45,
      55146955340815.76, 54444837877610.28, 53709946180354.79
,
      52945027091694.945, 52158112415694.79, 51354626109057.1
95,
      50540946881032.766, 49723710007237.66, 48910511576005.1
2,
      48108497631514.016, 47324015547571.586, 46564296560072.
016,
      45836417796426.48, 45144012723240.39, 44491164589062.91
,
      43883204016679.27, 43323551556545.4, 42812289319189.98,
42352151810909.12, 41951558842993.96, 41609572556377.09
,
      41331550550812.77, 41126059334256.52, 41004351836888.71
,
      40967930525976.56, 41001246650804.64, 41077805833778.76
6,

```

41164545982618.14, 41219666259056.3, 41189628109070.07,  
40990780018190.04, 40529881759768.45, 39635090395688.4,  
38087958508710.875, 35530224262919.92, 31393189052966.0  
08,  
25174433055907.145, 16795637554512.268,  
enein(1,2) = 60000000000000.0, 59962941237520.016, 5986725  
0566342.87,  
59703838452127.08, 59485184853022.37, 59205556569110.03  
,

58872591209671.39, 58485106557533.81, 58045531370610.30  
5,  
57558573577903.8, 57020188242888.29, 56438639988791.0,  
55813573292710.45,  
55146955340815.76, 54444837877610.28, 53709946180354.79  
,

52945027091694.945, 52158112415694.79, 51354626109057.1  
95,  
50540946881032.766, 49723710007237.66, 48910511576005.1  
2,  
48108497631514.016, 47324015547571.586, 46564296560072.  
016,  
45836417796426.48, 45144012723240.39, 44491164589062.91  
,

43883204016679.27, 43323551556545.4, 42812289319189.98,  
42352151810909.12, 41951558842993.96, 41609572556377.09  
,

41331550550812.77, 41126059334256.52, 41004351836888.71  
,

40967930525976.56, 41001246650804.64, 41077805833778.76  
6,  
41164545982618.14, 41219666259056.3, 41189628109070.07,  
40990780018190.04, 40529881759768.45, 39635090395688.4,  
38087958508710.875, 35530224262919.92, 31393189052966.0  
08,  
25174433055907.145, 16795637554512.268,  
enein(1,3) = 6000000000000.0, 59962941237520.016, 5986725  
0566342.87,  
59703838452127.08, 59485184853022.37, 59205556569110.03  
,

58872591209671.39, 58485106557533.81, 58045531370610.30  
5,  
57558573577903.8, 57020188242888.29, 56438639988791.0,  
55813573292710.45,  
55146955340815.76, 54444837877610.28, 53709946180354.79  
,

52945027091694.945, 52158112415694.79, 51354626109057.1  
95,  
50540946881032.766, 49723710007237.66, 48910511576005.1  
2,

48108497631514.016, 47324015547571.586, 46564296560072.  
 016,  
 45836417796426.48, 45144012723240.39, 44491164589062.91  
 ,  
 43883204016679.27, 43323551556545.4, 42812289319189.98,  
 42352151810909.12, 41951558842993.96, 41609572556377.09  
 ,  
 41331550550812.77, 41126059334256.52, 41004351836888.71  
 ,  
 40967930525976.56, 41001246650804.64, 41077805833778.76  
 6,  
 41164545982618.14, 41219666259056.3, 41189628109070.07,  
 40990780018190.04, 40529881759768.45, 39635090395688.4,  
 38087958508710.875, 35530224262919.92, 31393189052966.0  
 08,  
 25174433055907.145, 16795637554512.268,  
 tein = 4.44281005859, 4.43925062899, 4.43002880823, 4.4141  
 9954312,  
 4.39292066798, 4.3655572702, 4.33279584511, 4.294439552  
 91, 4.25064522772,  
 4.20181505414, 4.14740314882, 4.08818854875, 4.02400142  
 493, 3.95489433261,  
 3.88140403111, 3.80366320563, 3.72173074365, 3.63636384  
 601, 3.54797468075,  
 3.45708375922, 3.36412018512, 3.26984807583, 3.17490203  
 484, 3.07984626437,  
 2.98529582683, 2.89187263966, 2.7999924582, 2.710029026  
 34, 2.62236602787,  
 2.53721538174, 2.45456813656, 2.37451393386, 2.29738309  
 543, 2.22305211367,  
 2.1517115285, 2.08369714598, 2.01948207746, 1.959393847  
 29, 1.90409475533,  
 1.85436201111, 1.80979032805, 1.76817574884, 1.72655828  
 205, 1.68062782074,  
 1.62505517035, 1.55074463971, 1.44555848629, 1.28791463  
 034, 1.03491702324,  
 0.616721839132, 0.109689237026,  
 tescal = 1.0  
 tiscal = 1.0  
 tiin = 5.92374674, 5.91900084, 5.90670508, 5.88559939, 5.8  
 5722756, 5.82074303,  
 5.77706113, 5.7259194, 5.66752697, 5.60242007, 5.529870  
 86, 5.45091806,  
 5.36533523, 5.27319244, 5.17520537, 5.07155094, 4.96230  
 766, 4.84848513,  
 4.73063291, 4.60944501, 4.48549358, 4.35979743, 4.23320  
 271, 4.10646168,  
 3.98039443, 3.85583019, 3.73332328, 3.61337203, 3.49648  
 804, 3.38295384,

```
    3.27275751, 3.16601858, 3.06317746, 2.96406948, 2.86894
87, 2.77826286,
    2.69264277, 2.61252513, 2.53879301, 2.47248268, 2.41305
377, 2.35756766,
    2.30207771, 2.24083709, 2.16674023, 2.06765952, 1.92741
131, 1.71721951,
    1.37988936, 0.82229579, 0.14625232,
zeffin(1) = 1.426, 1.426, 1.4265, 1.4275, 1.429, 1.431, 1.
433, 1.4355, 1.438,
    1.441, 1.4445, 1.448, 1.452, 1.4565, 1.461, 1.4655, 1.4
71, 1.4765, 1.482, 1.488,
    1.4945, 1.501, 1.507, 1.5135, 1.52, 1.5255, 1.5305, 1.5
355, 1.5395, 1.542,
    1.5435, 1.544, 1.543, 1.5395, 1.534, 1.526, 1.5155, 1.5
035, 1.491, 1.479,
    1.4675, 1.4555, 1.4425, 1.43, 1.418, 1.407, 1.398, 1.39
15, 1.3885, 1.389, 1.391,
```

```
sigmamod = 'enabled'
isigmas = 0,0,1,1,0,0
mmsv = 4
```

```
&end
```

```
&trsetup
adimeth = 'disabled'
difusr = 400.0
difus_rshape(1) = 1.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0,
difus_vshape(1) = 1.0, 0.0, 0.0, 3.0,
nontran = 11
pinch = 'case3n'
relaxden = 0.001
relaxtsp = 'disabled'
transp = 'disabled'
advectr = 1.0
&end
```

```
&sousetup
asor(1,1,1) = 0.0
asor(1,2,1) = 0.0
noffso(1,1) = 10000
noffso(1,2) = 10000
nonso(1,1) = 0
nonso(1,2) = 0
nso = 1
nsou = 10000
pltso = 'enabled'
scm2(1,1) = 0.001
```

```
scm2(1,2) = 10000.0
sellm1(1,1) = 1.0
sellm1(1,2) = 1.0
sellm2(1,1) = 1.0
sellm2(1,2) = 1.0
sem1(1,1) = 1600.0
sem1(1,2) = 0.0
sem2(1,1) = 0.5
sem2(1,2) = 25.0
seppm1(1,1) = 1.0
seppm1(1,2) = 1.0
seppm2(1,1) = 1.0
seppm2(1,2) = 1.0
soucoord = 'disabled'
sthm1(1,1) = 5.0
sthm1(1,2) = 0.0
szm1(1,1) = 0.0
szm1(1,2) = 0.0
szm2(1,1) = 100000.0
szm2(1,2) = 100000.0
knockon = 'disabled'
komodel = 'th'
flemodel = 'th_pol'
jfl = 150
nkorfn = 0
nonko = 0
noffko = 10000
soffvte = 4.5
isoucof = 1
faccof = 0.5
xlfac = 0.1
xllwr = 0.085
xlmdl = 0.25
xlpctlwr = 0.1
xlpctmdl = 0.4
&end
```

```
&eqsetup
atol = 1e-08
bsign = 1
ellptcty = 0.0
eqmod = 'enabled'
eqpower = 2
eqsource = 'eqdsk'
eqdskin = "eqdsk"
fpsimodl = 'constant'
methflag = 10
nconteq = 'disabled'
nconteqn = 50
```

```

rbox = 92.0
rboxdst = 120.0
rmag = 166.0
rtol = 1e-08
zbox = 92.0
&end

&rfsetup
rdcmod='disabled'
call_lh='disabled',
call_ech='disabled',
call_fw='disabled',
lh='disabled',
ech='disabled',
fw='disabled',
! iurfl(1)='enabled', !'disabled' !so no double application
of linear damping
! iurfl(1)='disabled','enabled' !so no double application
of linear damping
iurfl(1)='disabled','disabled',
iurfcoll(1)='damp_out','damp_out'!'disabled','disabled' !
nharms=5,1 ! alphas,e !Choose appropriately to cover the plasma cross-section
nharm1= 5,0 ! alphas,e ! range: nharm1(i) to nharm1(i)+(nharms(i)-1)
nrfitr1=1000,
nrfitr2=0,
nrfitr3=1,
nrfpwr=0,
nrfstep1(1)=1000,
nrfstep1(2)=1000,
nrfstep2=000,
nondamp=0
noffrf(1)=100000, 100000
nonrf(1)=0, 0
nrf=0

nrfspecies(1)=1,2      !----- alphas,e

pwrscal(1)= 1.0 1.0 ! 1.0 1.0 TODO switch back to 1!one value type: FW, so - one value needed?
rfread='netcdf'
rffile(1)='genray.nc'
'genray.nc'

rftype(1)='fw' 'fw'    !----- for alphas and e
nbssltbl=200000
nurftime=0
pwrscal1(1)=0.0,0.10,0.30,1.00,

```

```

urftime(1)= 0.0,0.05,0.10,0.15, !sec
!!! pwrscale1(1)=0.0,0.0,0.15433,0.37111,.64866,1.0,1.0
!!! urftime(1)=0.0,0.2,0.205,0.210,0.215,0.220,0.225
scaleurf='enabled',
urfdmp='firstd',
urfmod='enabled', !-----
urfrstrt='disabled',
urfwrray='disabled',
vlfmod='disabled',
vlhmod='disabled',
vparmax=.7956,
vparmin=.1768,
vprprop='disabled'
&end

&frsetup
aheigh(1,1) = 47.8
aheigh(1,2) = 47.8
aheigh(2,1) = 48.0
aheigh(2,2) = 48.0
alen(1,1) = 186.1
alen(1,2) = 186.1
alen(2,1) = 346.0
alen(2,2) = 346.0
alen(3,1) = 449.0
alen(3,2) = 449.0
alen(4,1) = 500.0
alen(4,2) = 500.0
angleh(1) = 19.5
angleh(2) = 19.5
anglev(1) = 0.0
anglev(2) = 0.0
ashape(1,1) = 's-rect'
ashape(1,2) = 's-rect'
ashape(2,1) = 's-rect'
ashape(2,2) = 's-rect'
ashape(3,1) = 'b-d3d'
ashape(3,2) = 'b-d3d'
ashape(4,1) = 'b-circ'
ashape(4,2) = 'b-circ'
awidth(1,1) = 13.8
awidth(1,2) = 13.8
awidth(2,1) = 17.7
awidth(2,2) = 17.7
awidth(4,1) = 50.9
awidth(4,2) = 50.9
bhdiv(1) = 0.5
bhdiv(2) = 0.5
bheigh(1) = 48.0

```

bheigh(2) = 10.0  
bhofset(1) = 42.074  
bhofset(2) = 42.074  
bleni(1) = 556.808  
bleni(2) = 556.808  
blenp(1) = 539.0  
blenp(2) = 539.0  
bmsprd = 0.1  
bptor(1) = 5000000 !5000000  
bptor(2) = 0.d0 !5000000  
bcur(2) = 0  
bshape(1) = 'rect-lps'  
bshape(2) = 'rect-lps'  
bvdiv(1) = 1.3  
bvdiv(2) = 1.3  
bvfoc(1) = 1000.0  
bvfoc(2) = 1000.0  
bvofset(1) = 0.0  
bvofset(2) = 0.0  
bwidth(1) = 12.0  
bwidth(2) = 12.0  
ebkev(1) = 80  
ebkev(2) = 80  
fbcur(1,1) = 0.75  
fbcur(1,2) = 0.75  
fbcur(2,1) = 0.15  
fbcur(2,2) = 0.15  
fbcur(3,1) = 0.1  
fbcur(3,2) = 0.1  
frmod = 'enabled'  
frplt = 'enabled'  
ibcur = 1  
iborb = 0  
iexxit = 0  
inubpat = 0  
multiply = 'disabled'  
naptr = 4  
nbeams = 1  
nfrplt = 400  
nimp = 0  
npart = 30000 !10000  
nprim = 1 !2  
npskip = 1  
nsourc = 1 !2  
rpivot(1) = 286.6  
rpivot(2) = 286.6  
sfrac1(1) = 0.0  
sfrac1(2) = 0.0  
smooth = 0.125

zpivot(1) = 0.0  
zpivot(2) = 0.0  
&end

## PARAMETER VALUES

```
=====> version = cql3d_git_210125.1
=====> precursr = cql3d_git_201207.0
ngena is the max. # of general (time advanced) species
=====> ngena = 4
nmaxa is the max. # of background Maxwellian species
=====> nmaxa = 8
```

lza is the maximum number of z mesh points  
=====> lza = 128

lrza is the maximum number of radial flux surfaces  
=====> lrza = 128  
analytic source routine parameters  
nsoa is the number of sources per species.  
=====> nsoa = 3

nplota is max number of plot times for 2d and 3d plots.  
=====> nplota = 10  
nbctimea is max number of points in arrays giving time  
dependent profile information.  
=====> nbctimea = 101  
ndtr1a is maximum number of time step intervals dtr1().  
=====> ndtr1a = 10  
nefitera is the max number of iterations permitted for  
electric field per time step (to obtain target current).  
=====> nefitera = 10

nmodsa is max number of wave modes or harmonics for  
a single mode. CHECK code, for values .ne. 3.  
=====> nmodsa = 155

## PARAMETER VALUES

EQUILIBRIUM model parameters:

nnra,nnza give the Maximum size the eqdsk  
=====>NNRA = 257 =====>NNZA = 257  
=====>NCONTEQA = 129

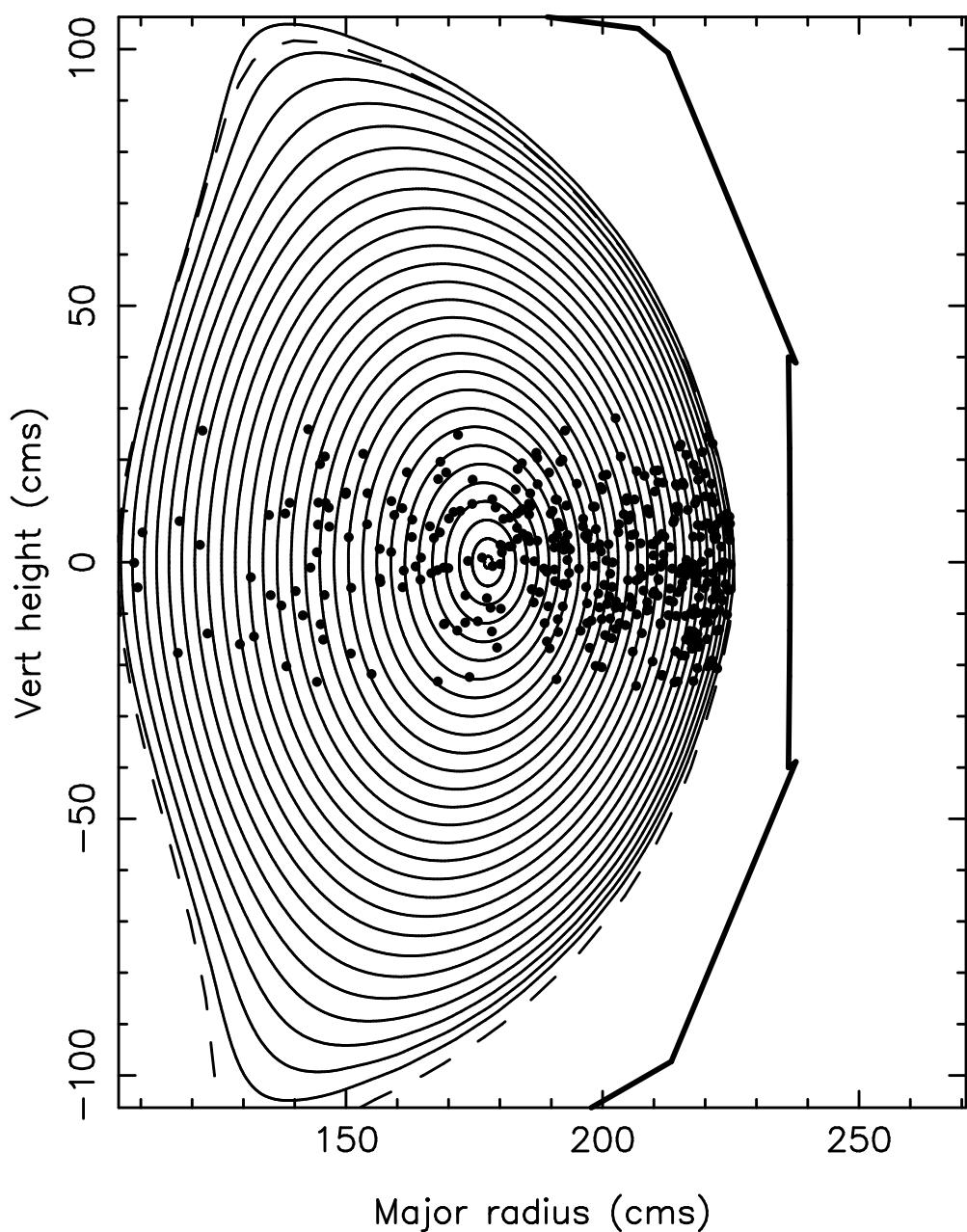
Urf (lower hybrid, fast wave, ech, ebw...) parameters:

=====>NMODSA = 155

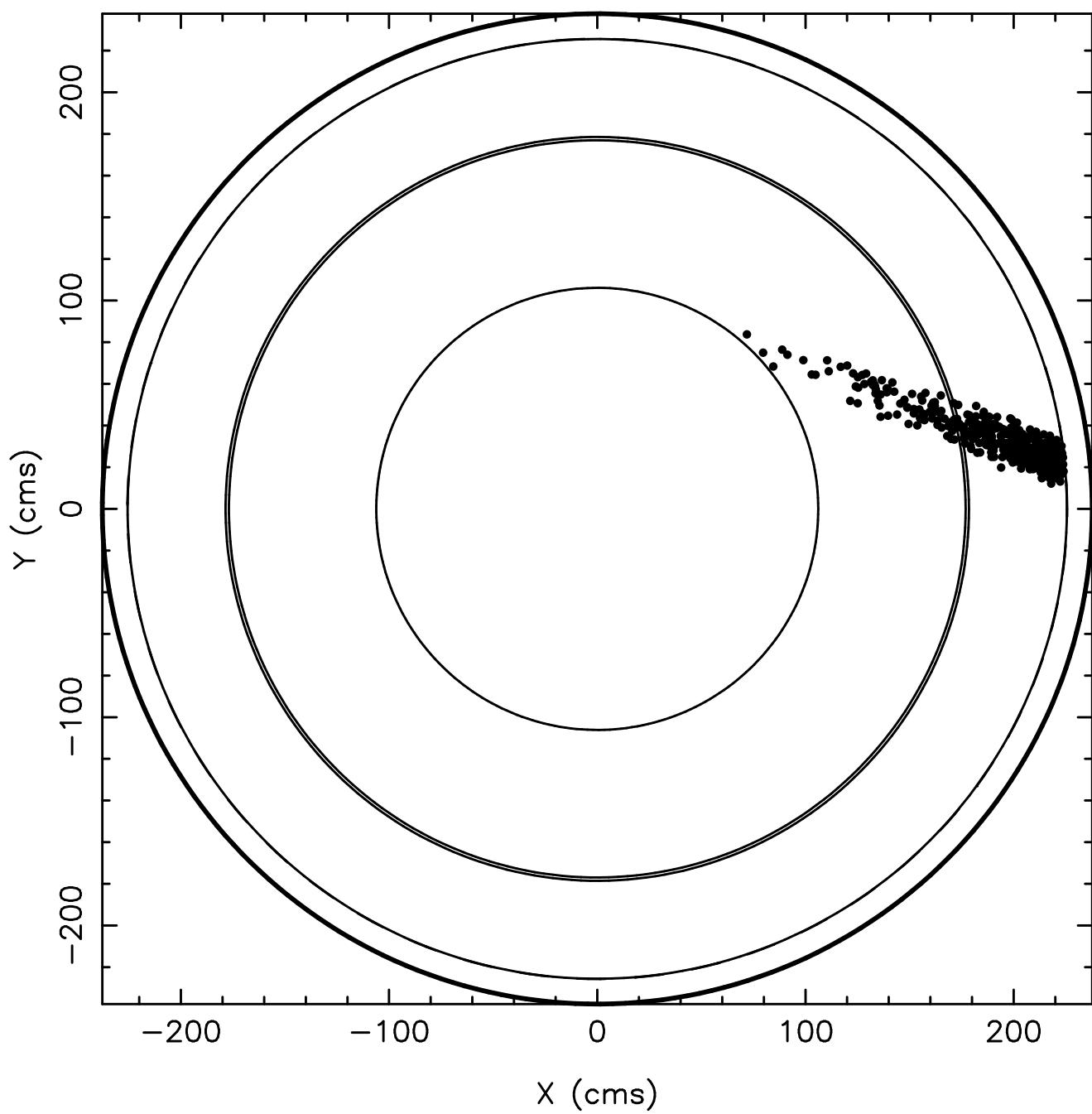
FR (freya beam deposition) model parameters:

npart is the number of ions launched  
=====>npart = 30000

NBI Deposition

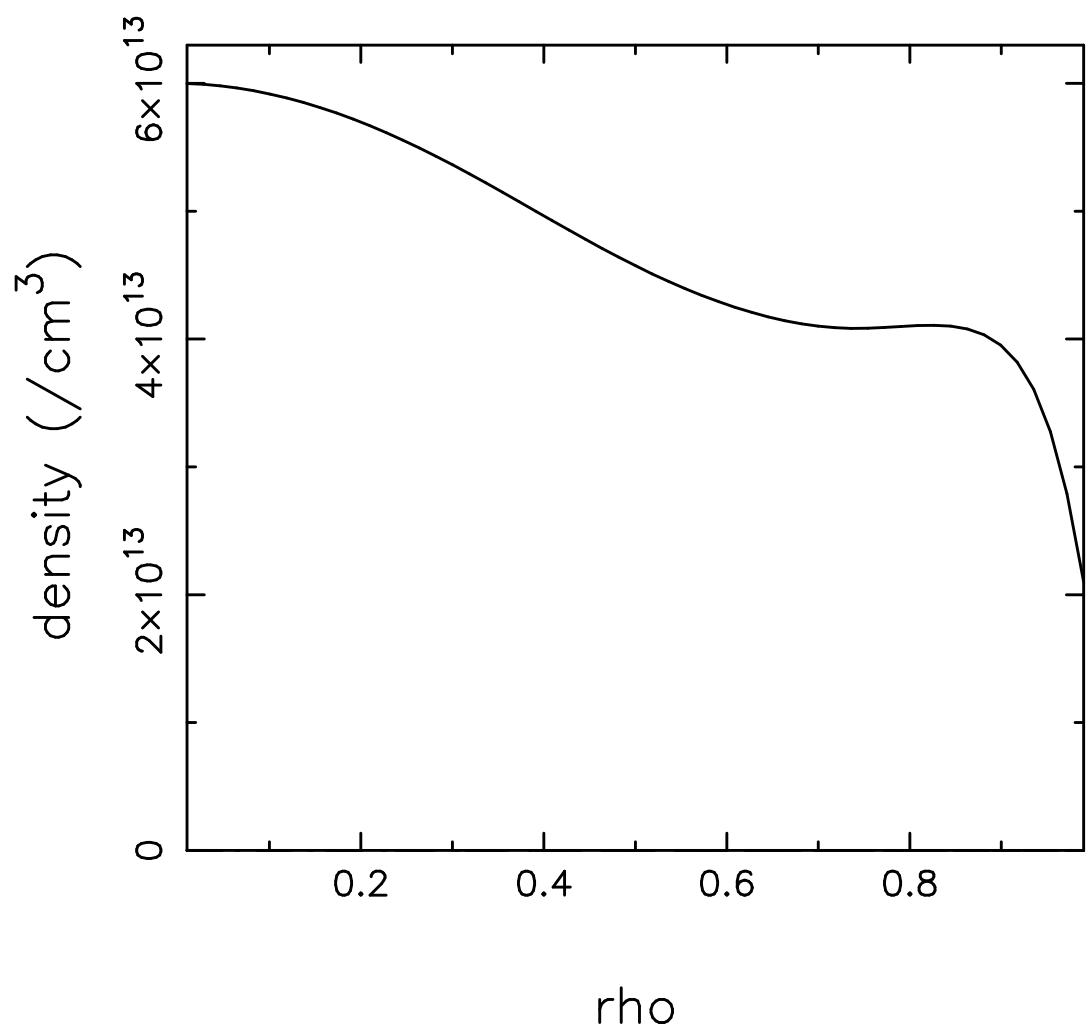


NBI Deposition



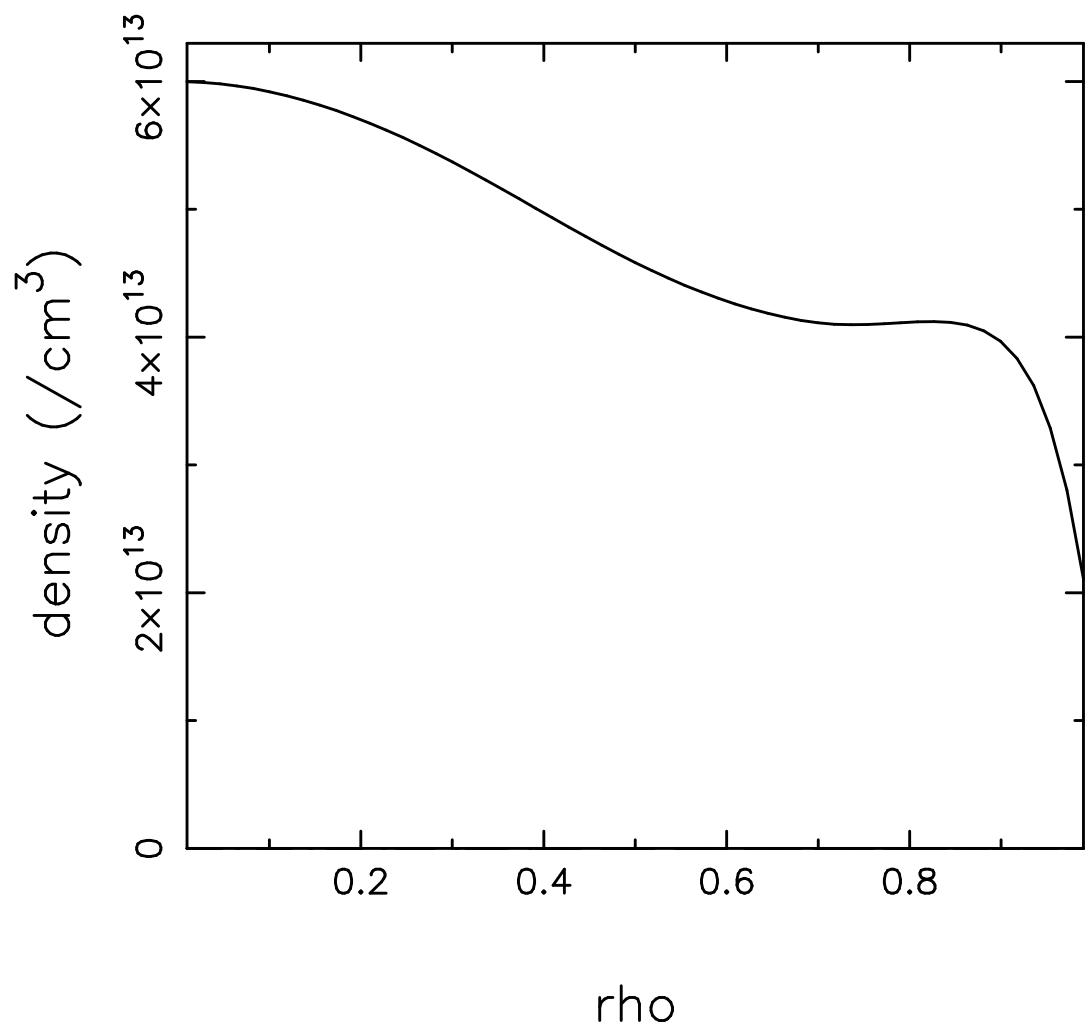
## DENSITIES (/CC) OF SPECIES

species no. 1 D general time step n= 0



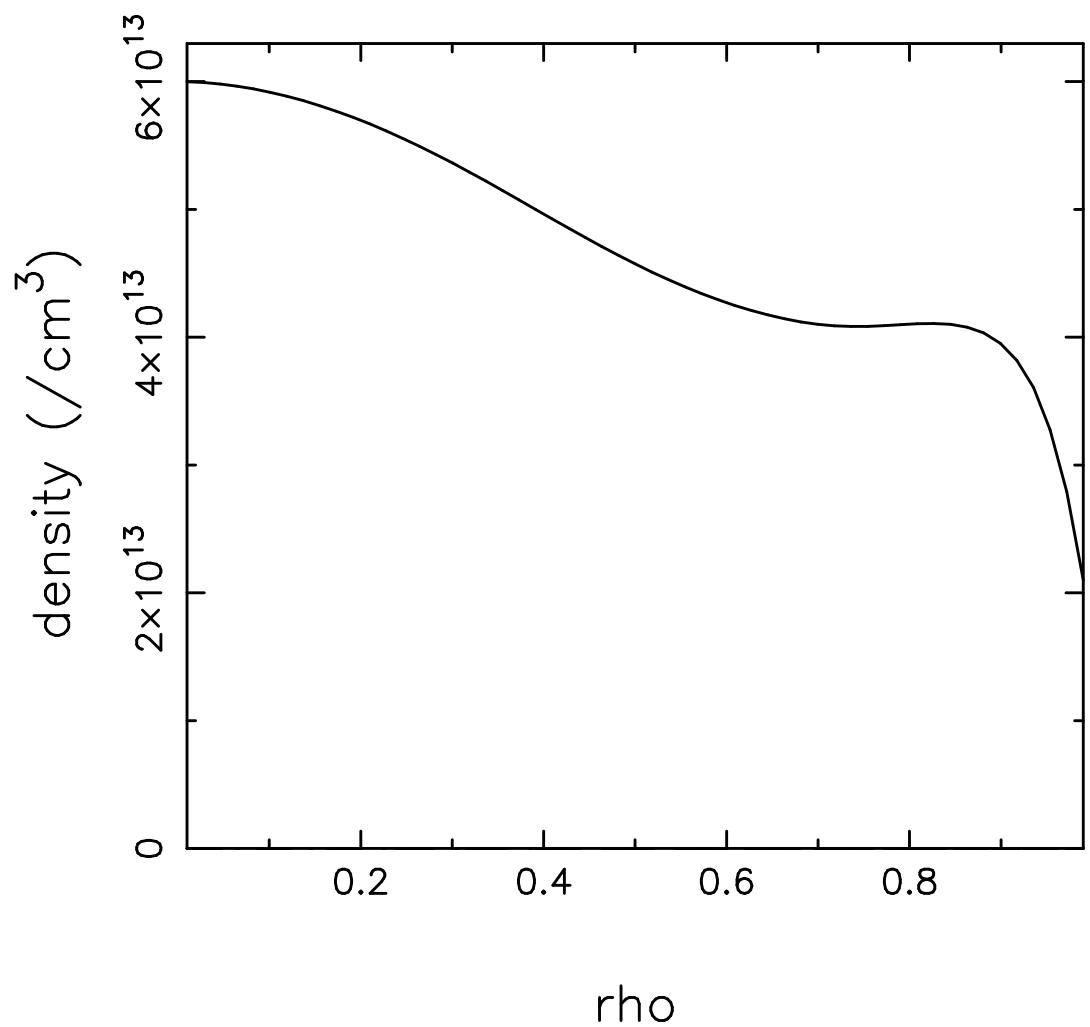
## DENSITIES (/CC) OF SPECIES

species no. 2 e general time step n= 0



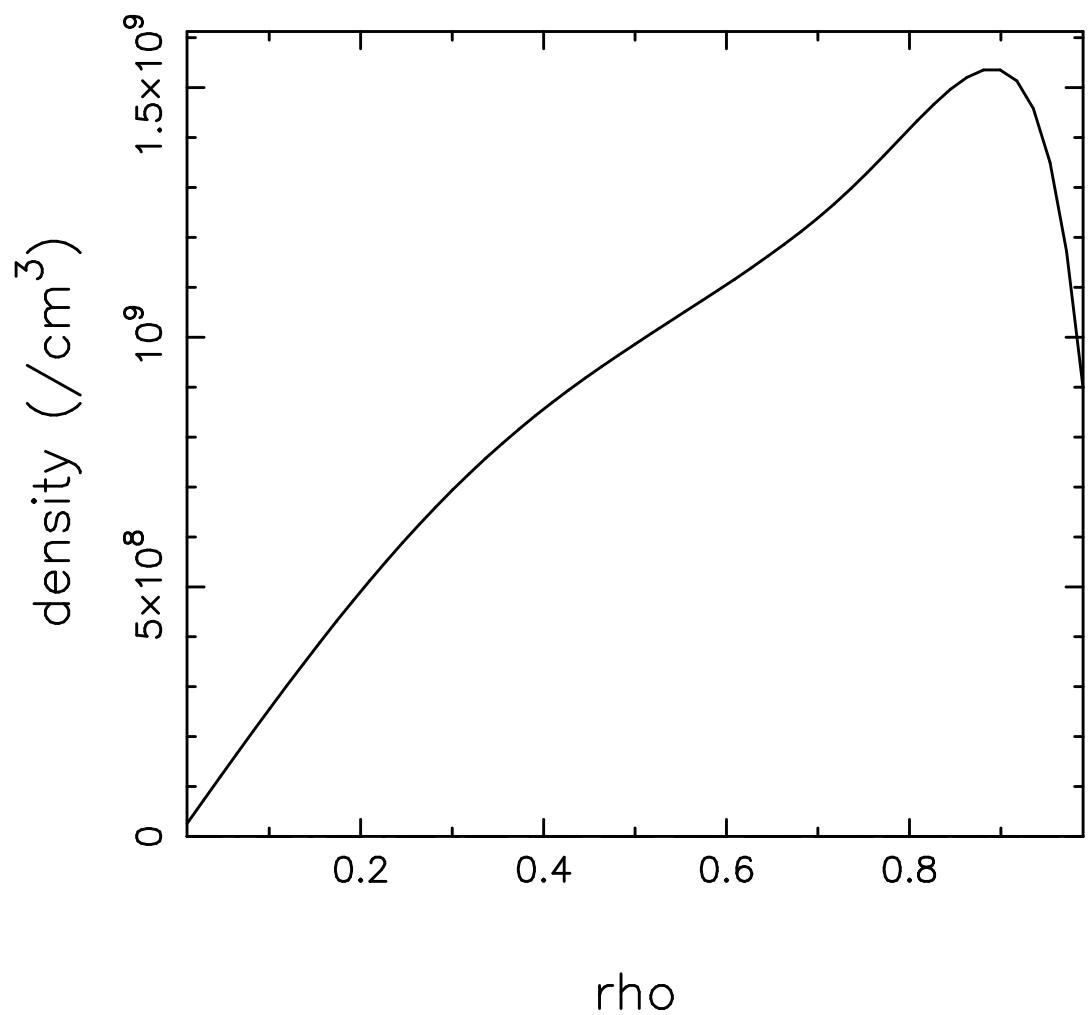
## DENSITIES (/CC) OF SPECIES

species no. 3 D maxwell time step n= 0



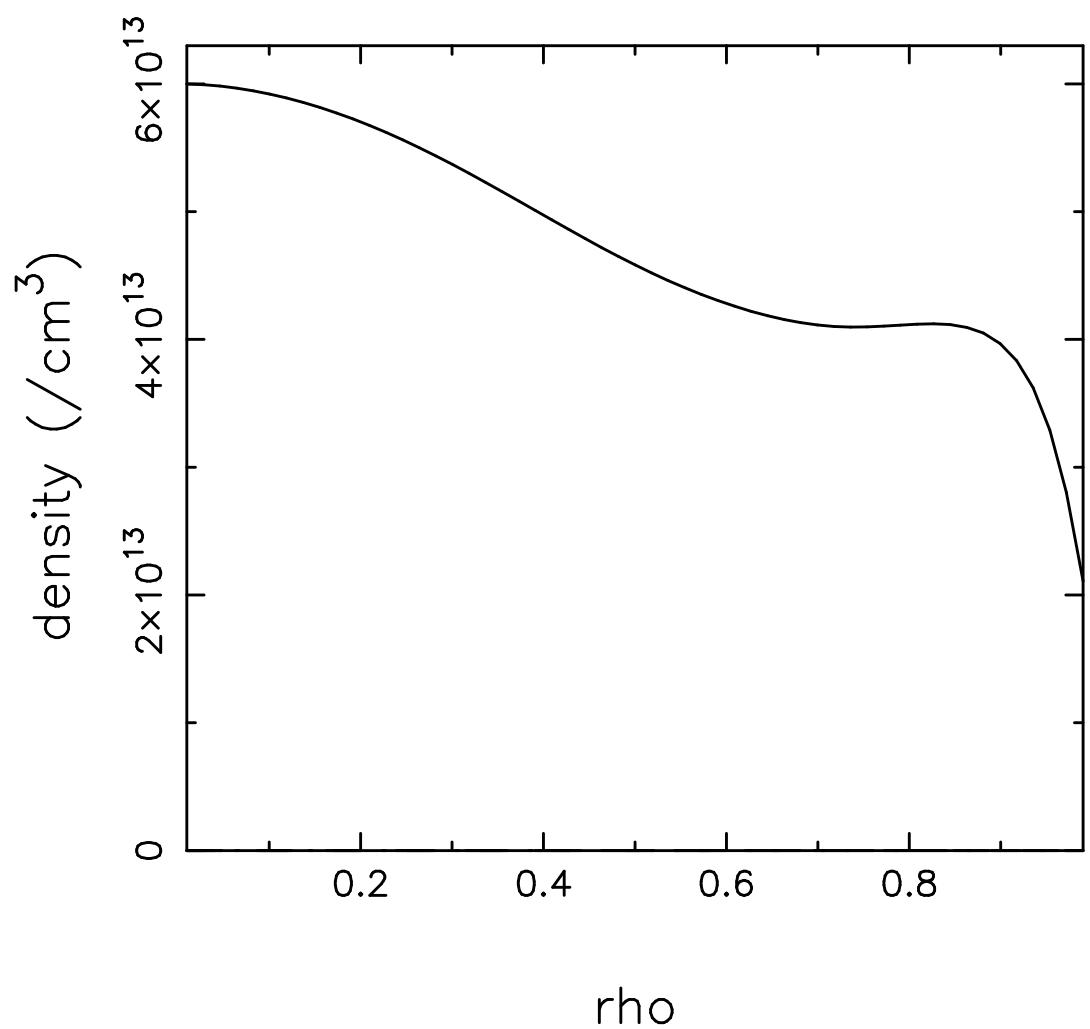
## DENSITIES (/CC) OF SPECIES

species no. 4      impurity    maxwell      time step n= 0



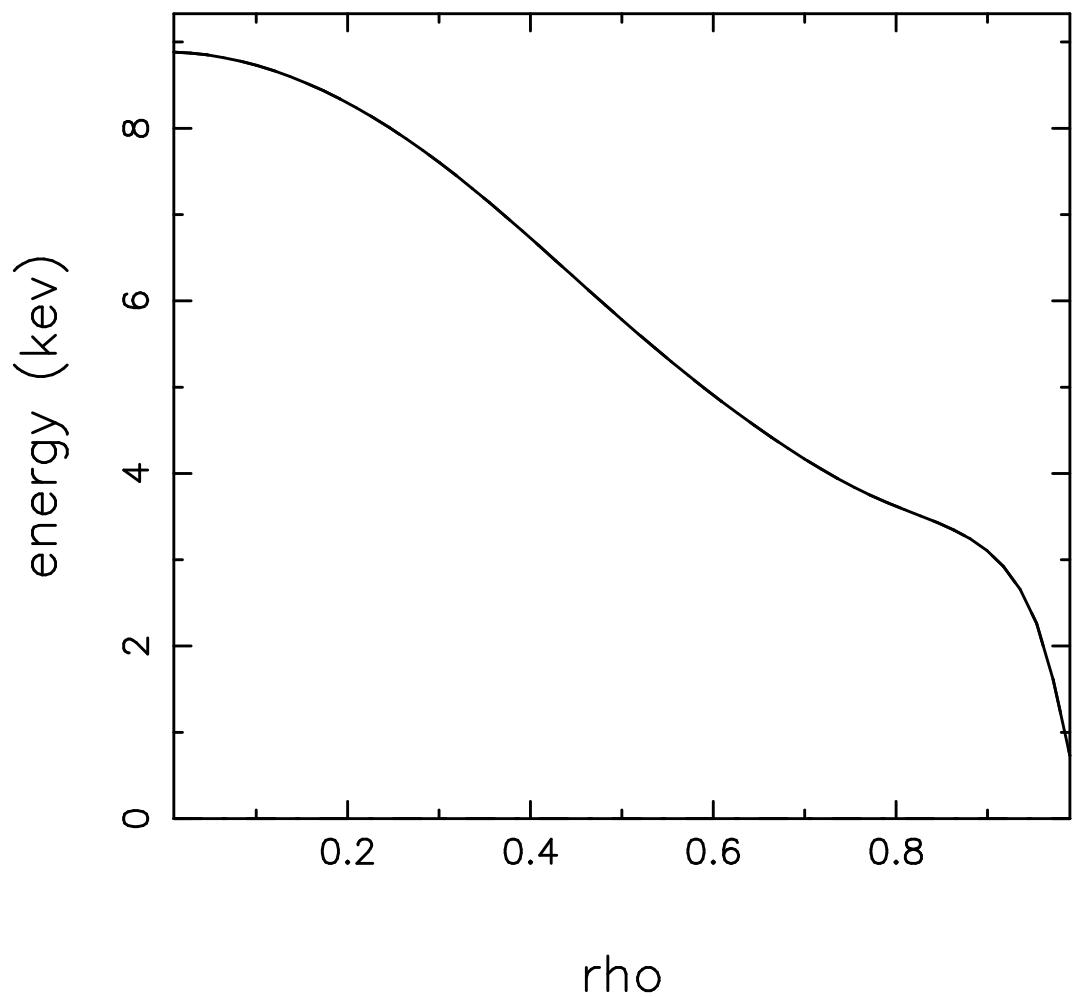
## DENSITIES (/CC) OF SPECIES

species no. 5 e maxwell time step n= 0



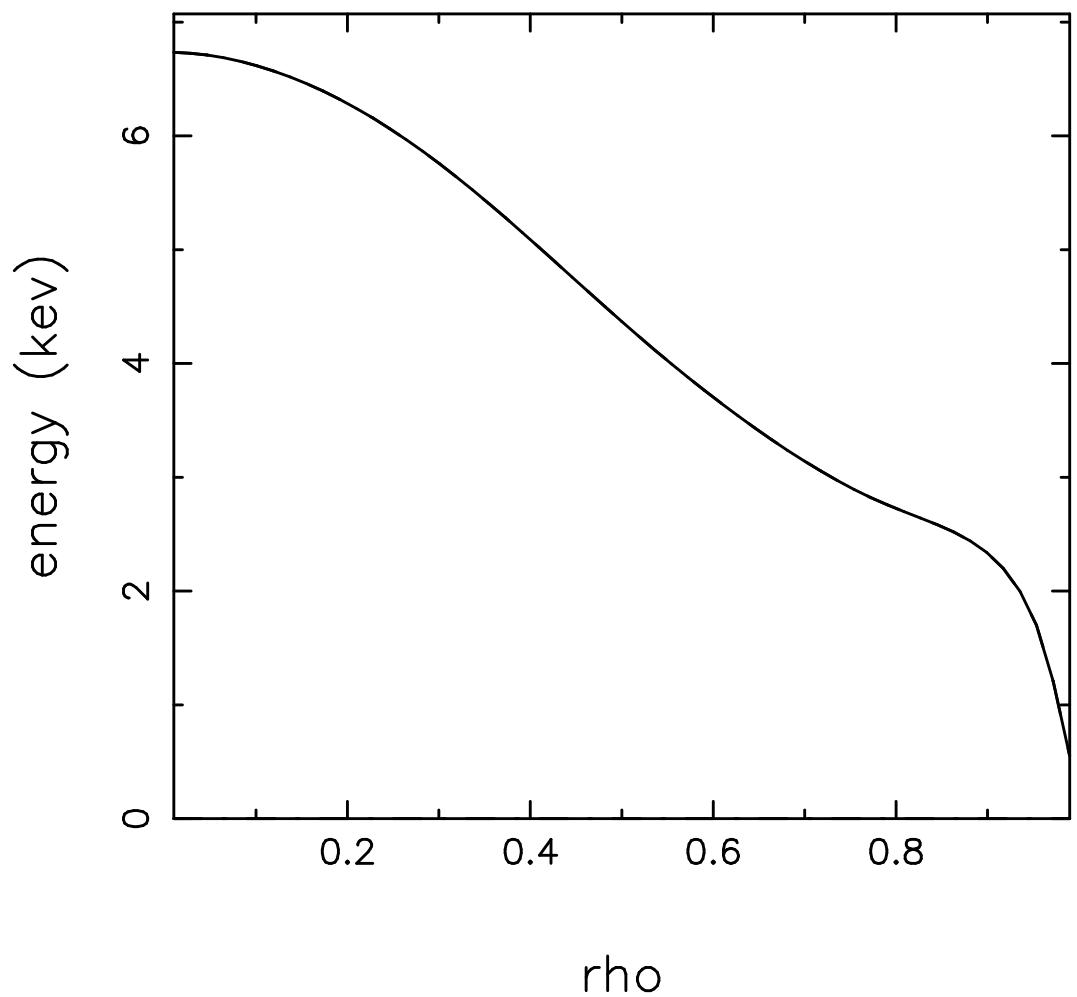
ENERGIES OF SPECIES IN KEV  
(Solid: <..>\_FSA)

species no. 1 D general time step n= 0



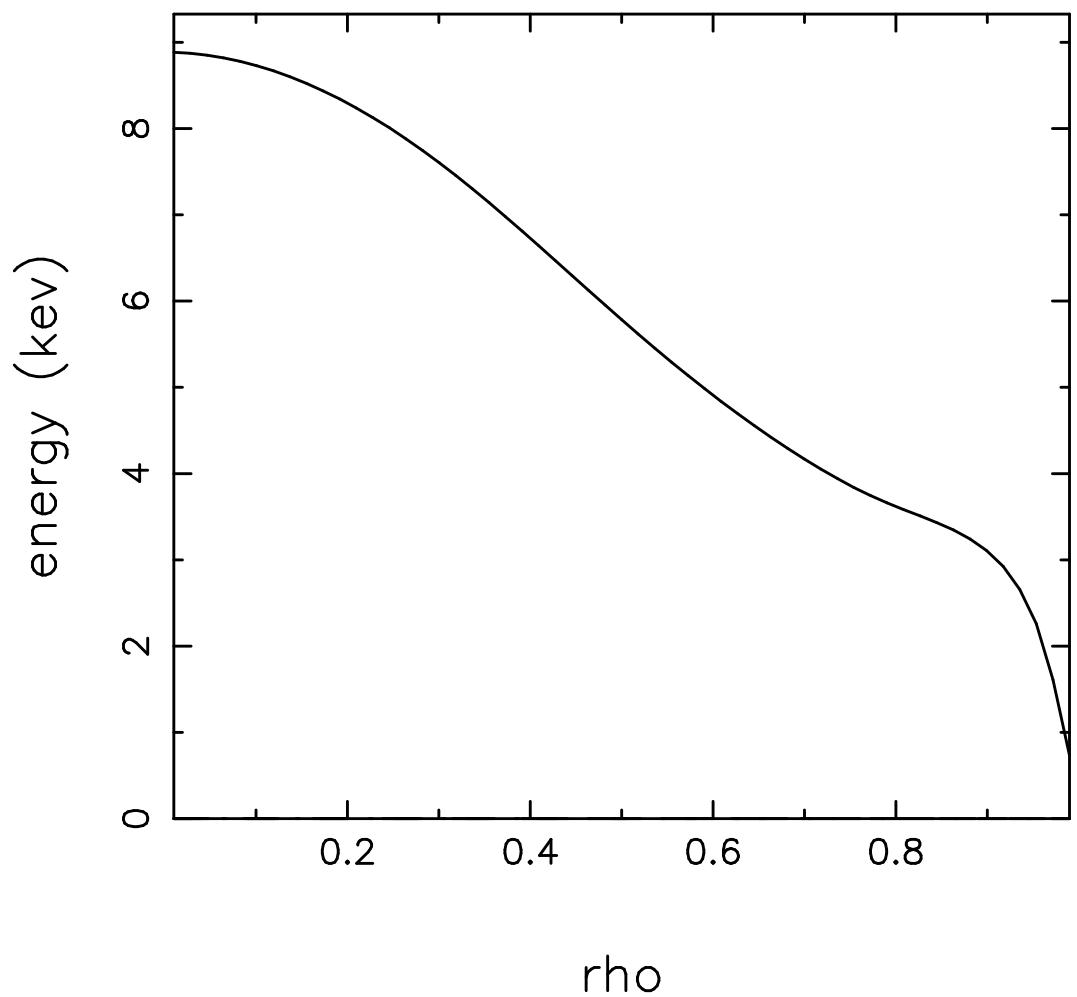
ENERGIES OF SPECIES IN KEV  
(Solid: <..>\_FSA)

species no. 2 e general time step n= 0



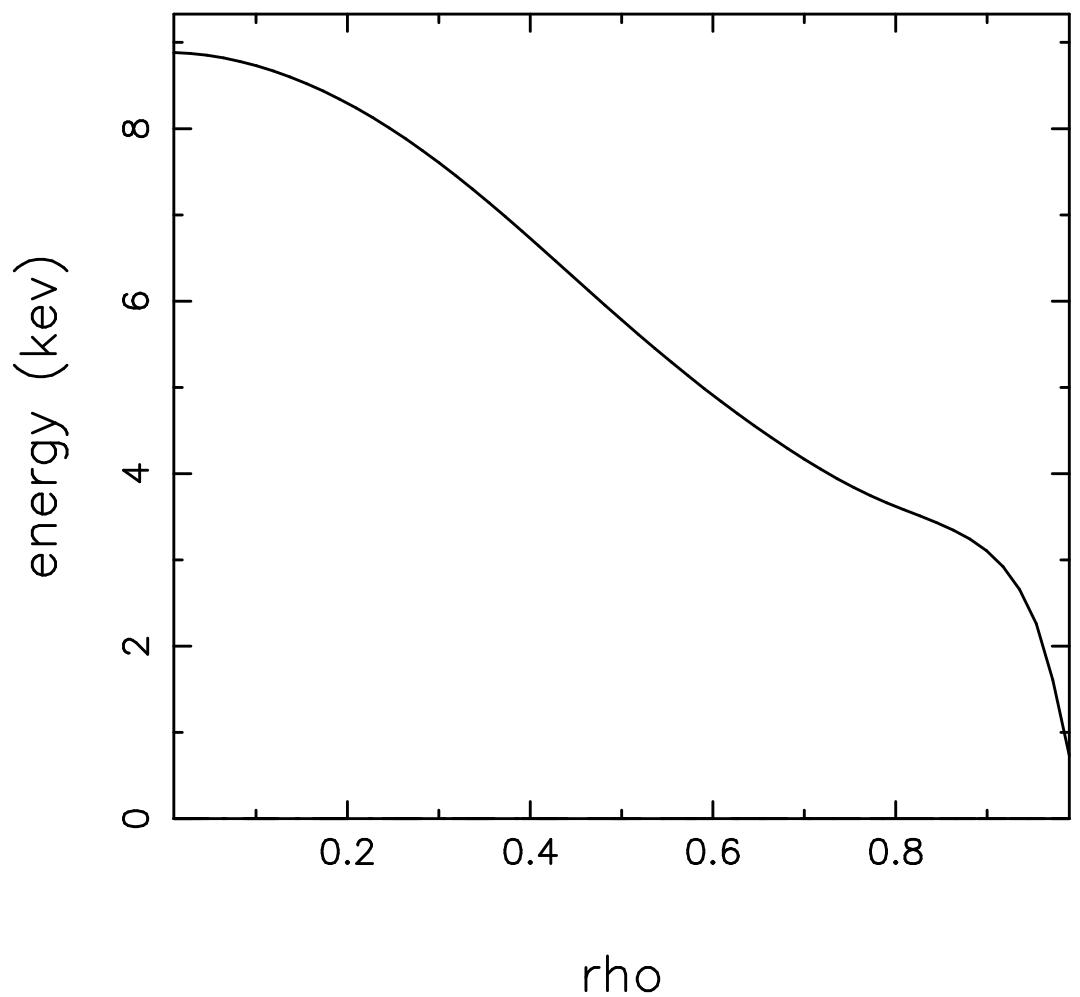
## ENERGIES OF SPECIES IN KEV

species no. 3 D maxwell time step n= 0



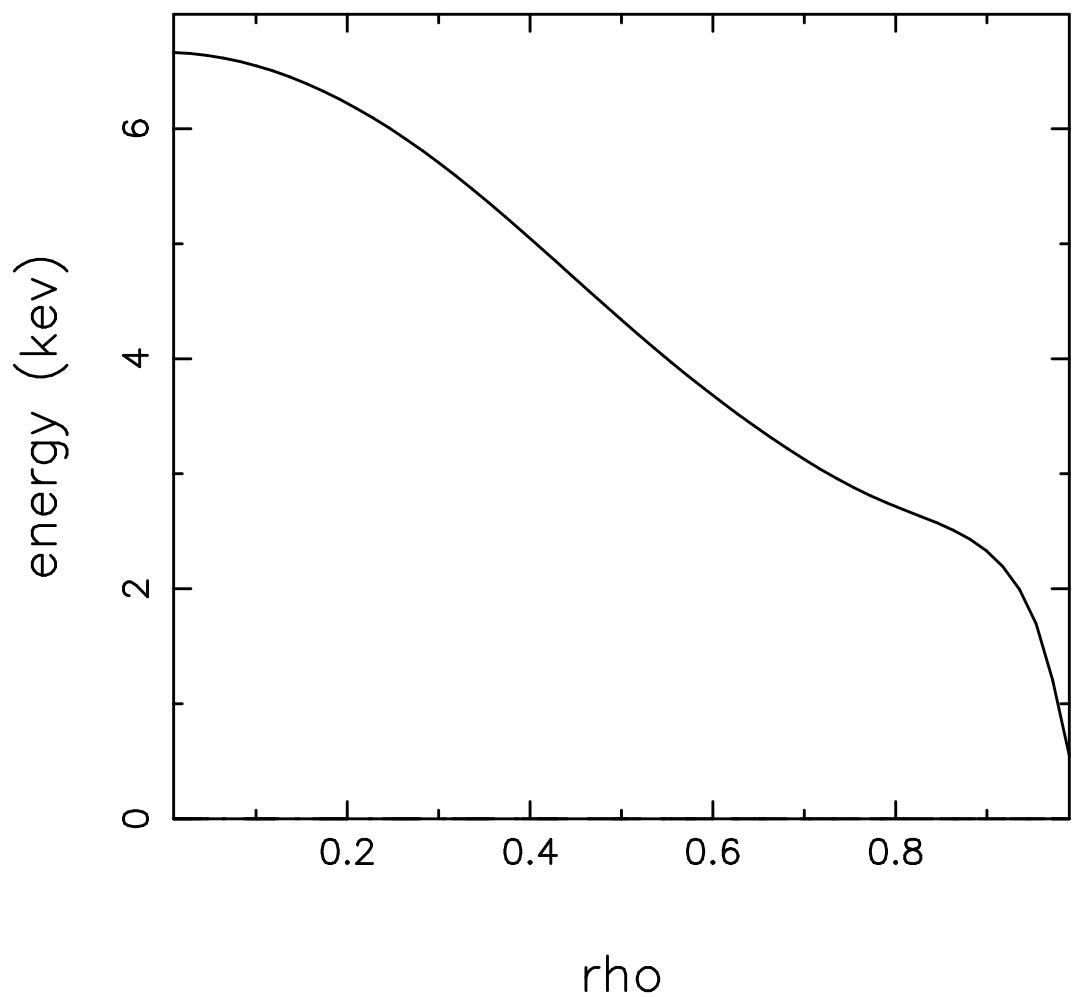
## ENERGIES OF SPECIES IN KEV

species no. 4      impurity    maxwell      time step n= 0

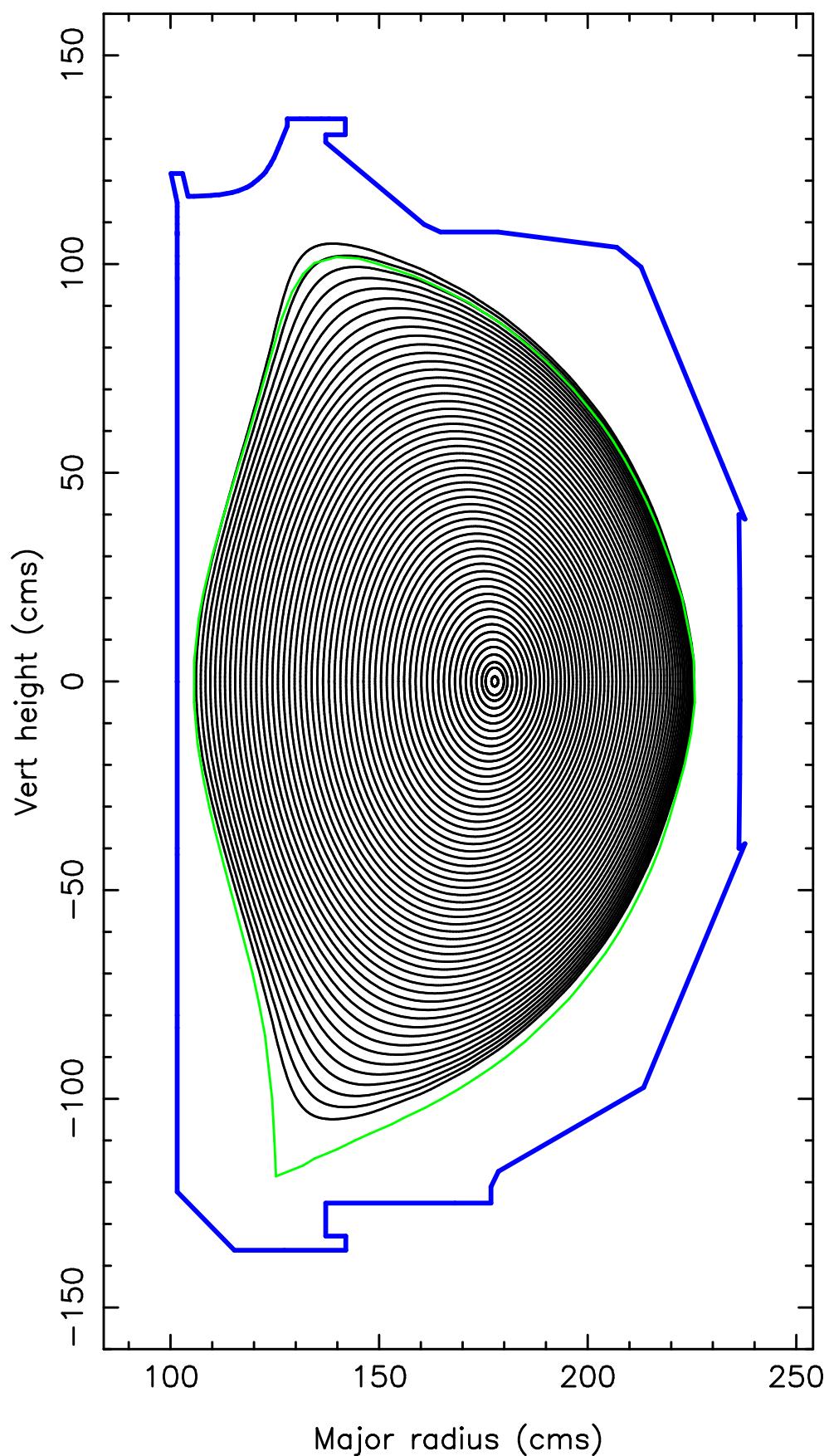


## ENERGIES OF SPECIES IN KEV

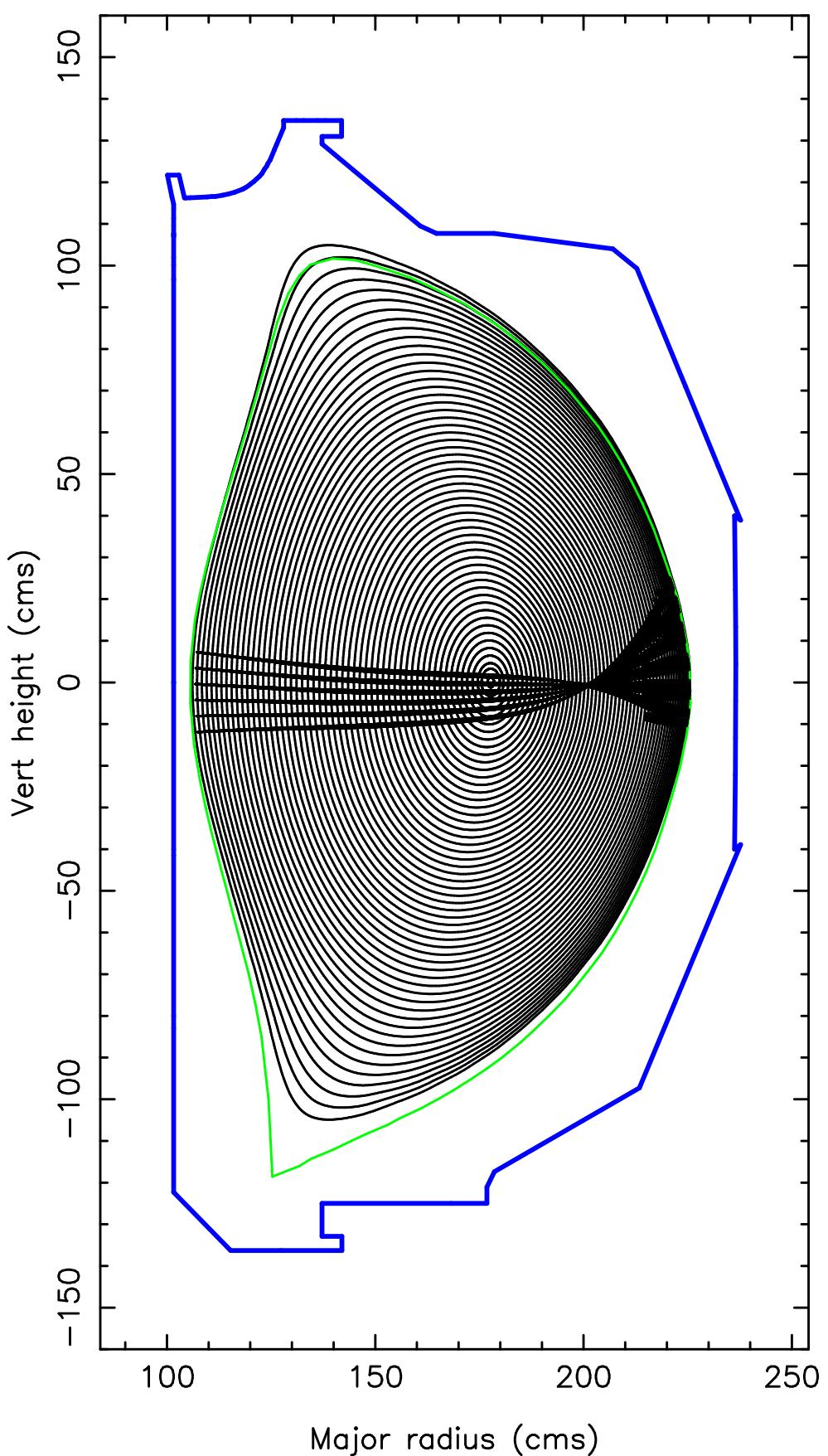
species no. 5 e maxwell time step n= 0



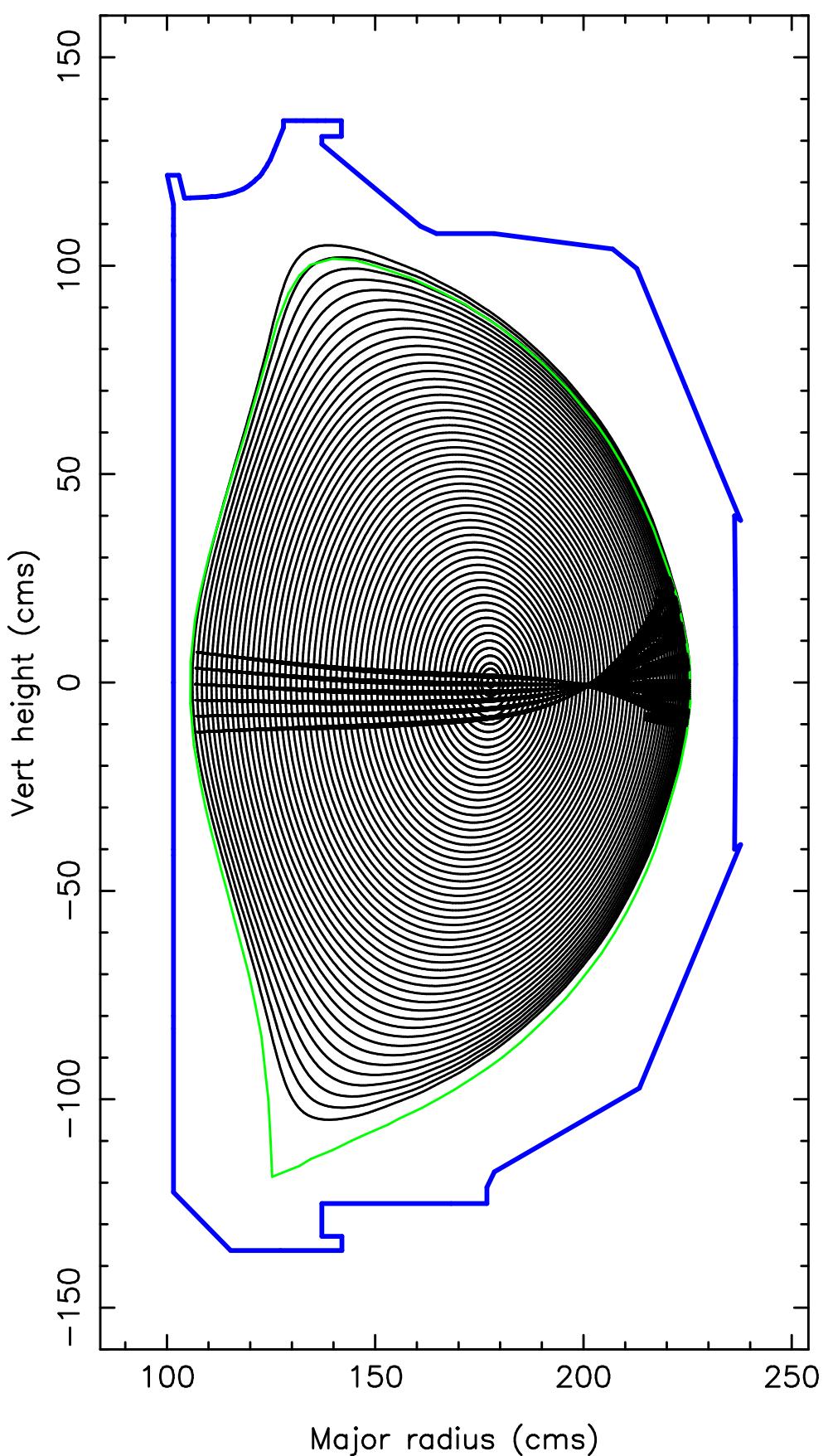
### Fokker–Planck Flux Surfaces



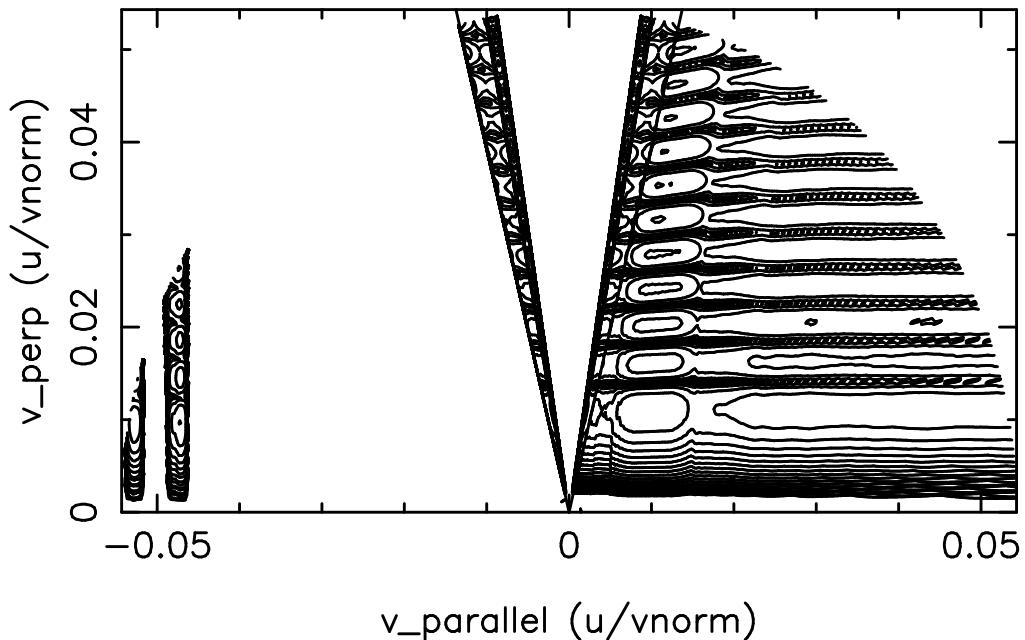
Fokker–Planck Flux Surfaces + Rays  
krf type= 1 nharm1,nharms= 5 5 f[Hz]= 0.96000E+08



Fokker–Planck Flux Surfaces + Rays  
krf type= 2 nharm1,nharms= 0 1 f[Hz]= 0.96000E+08



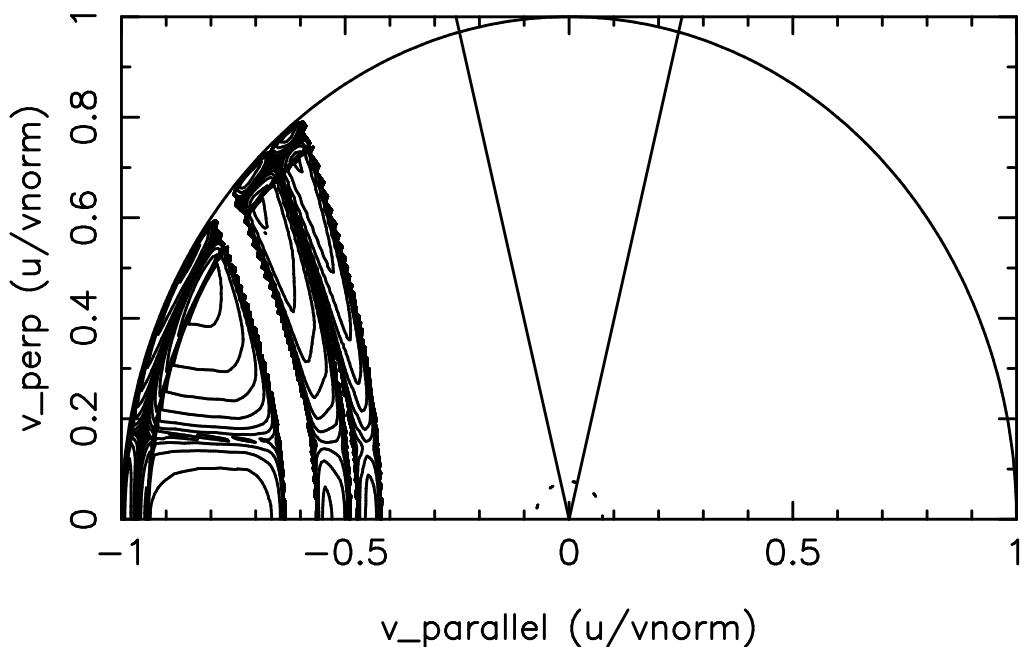
Contours of UrfB vs. v\_parallel,v\_perp



time step n= 99 time= 6.96E-01 secs  
r/a= 8.259E-02 radial position (R)= 1.8308E+02 cm  
rya= 8.259E-02 R=rpcon= 1.8308E+02 cm, Surf# 5

Contours of the rf (v,v) diffusion coefficient, urfb  
Flux surface number 5; all modes  
Max value for this surface/mode: 0.237E-01  
Species k=1

Contours of UrfB vs. v\_parallel,v\_perp



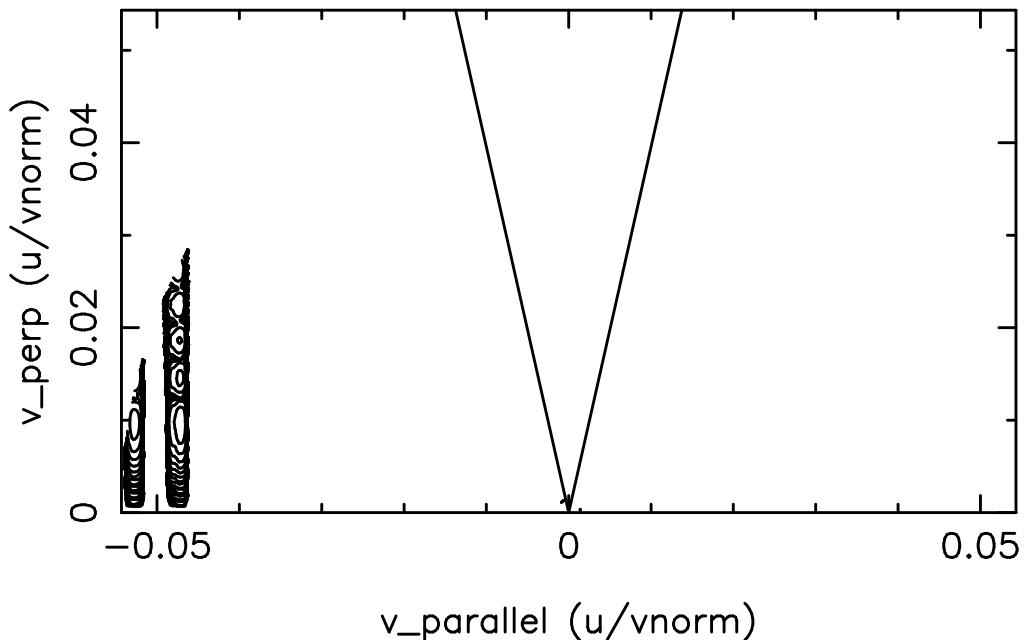
time step n= 99 time= 6.96E-01 secs  
r/a= 8.259E-02 radial position (R)= 1.8308E+02 cm  
rya= 8.259E-02 R=rpcon= 1.8308E+02 cm, Surf# 5

Contours of the rf (v,v) diffusion coefficient, urfb  
Flux surface number 5; all modes  
Max value for this surface/mode: 0.701E+02  
Species k=2

Contours of the rf (v,v) diffusion coefficient, urfb  
Flux surf.N 5; mode,nharm= 1 5; Species k=1  
Max value for this surface/mode: 0.760E-05

Contours of the rf (v,v) diffusion coefficient, urfb  
Flux surf.N 5; mode,nharm= 2 6; Species k=1  
Max value for this surface/mode: 0.173E-04

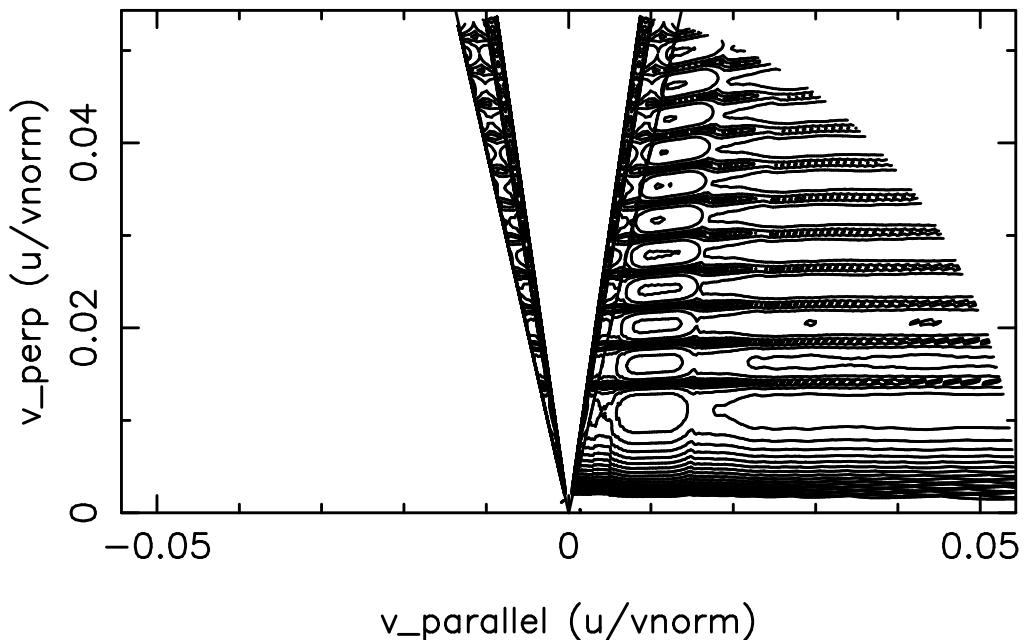
Contours of UrfB vs. v\_parallel,v\_perp



time step n= 99 time= 6.96E-01 secs  
r/a= 8.259E-02 radial position (R)= 1.8308E+02 cm  
rya= 8.259E-02 R=rpcon= 1.8308E+02 cm, Surf# 5

Contours of the rf ( $v,v$ ) diffusion coefficient, urfb  
Flux surf.N 5; mode,nharm= 3 7; Species k=1  
Max value for this surface/mode: 0.497E-04

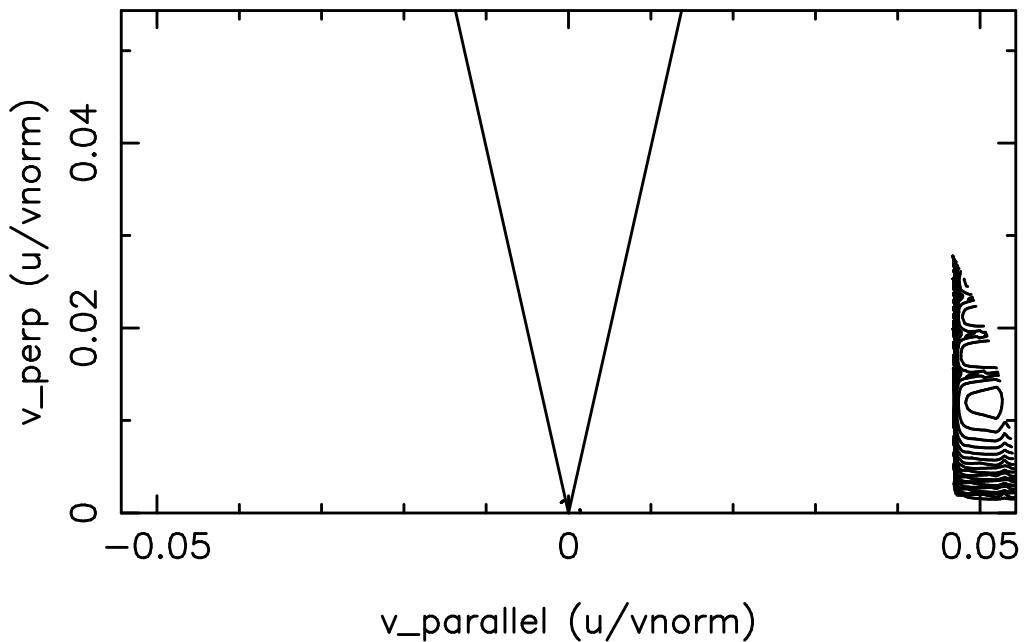
Contours of UrfB vs. v\_parallel,v\_perp



time step n= 99 time= 6.96E-01 secs  
r/a= 8.259E-02 radial position (R)= 1.8308E+02 cm  
rya= 8.259E-02 R=rpcon= 1.8308E+02 cm, Surf# 5

Contours of the rf (v,v) diffusion coefficient, urfb  
Flux surf.N 5; mode,nharm= 4 8; Species k=1  
Max value for this surface/mode: 0.528E-02

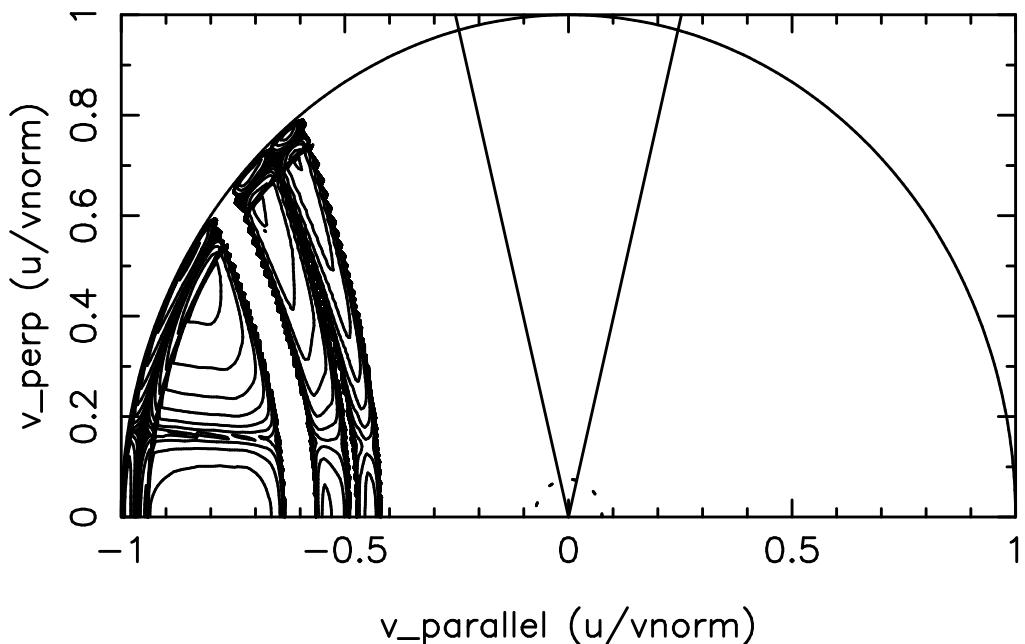
Contours of UrfB vs. v\_parallel,v\_perp



time step n= 99 time= 6.96E-01 secs  
r/a= 8.259E-02 radial position (R)= 1.8308E+02 cm  
rya= 8.259E-02 R=rpcon= 1.8308E+02 cm, Surf# 5

Contours of the rf (v,v) diffusion coefficient, urfb  
Flux surf.N 5; mode,nharm= 5 9; Species k=1  
Max value for this surface/mode: 0.237E-01

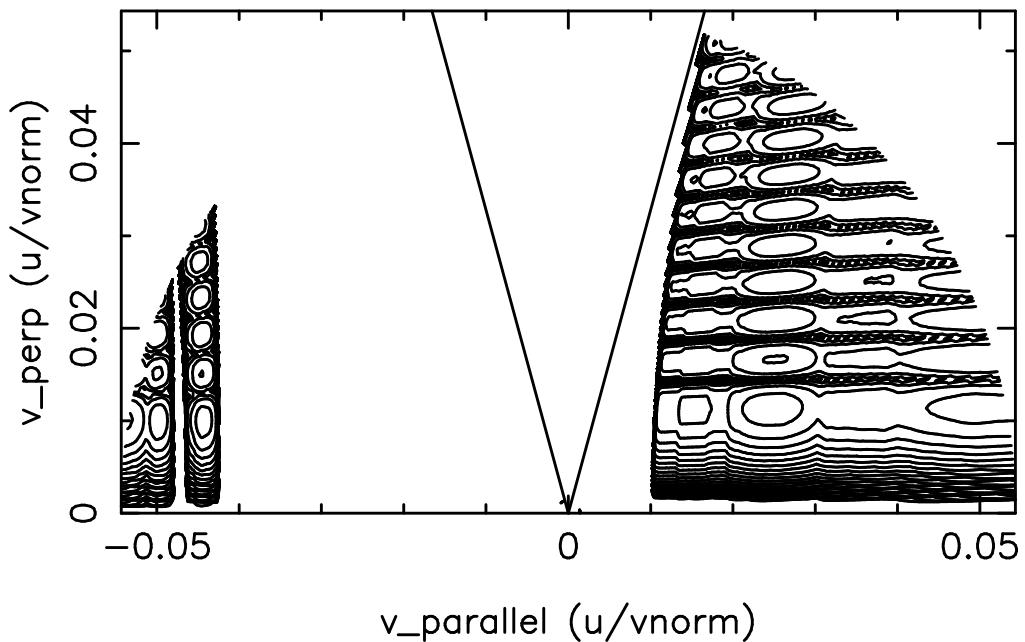
Contours of UrfB vs. v\_parallel,v\_perp



time step n= 99 time= 6.96E-01 secs  
r/a= 8.259E-02 radial position (R)= 1.8308E+02 cm  
rya= 8.259E-02 R=rpcon= 1.8308E+02 cm, Surf# 5

Contours of the rf (v,v) diffusion coefficient, urfb  
Flux surf.N 5; mode,nharm= 6 0; Species k=2  
Max value for this surface/mode: 0.701E+02

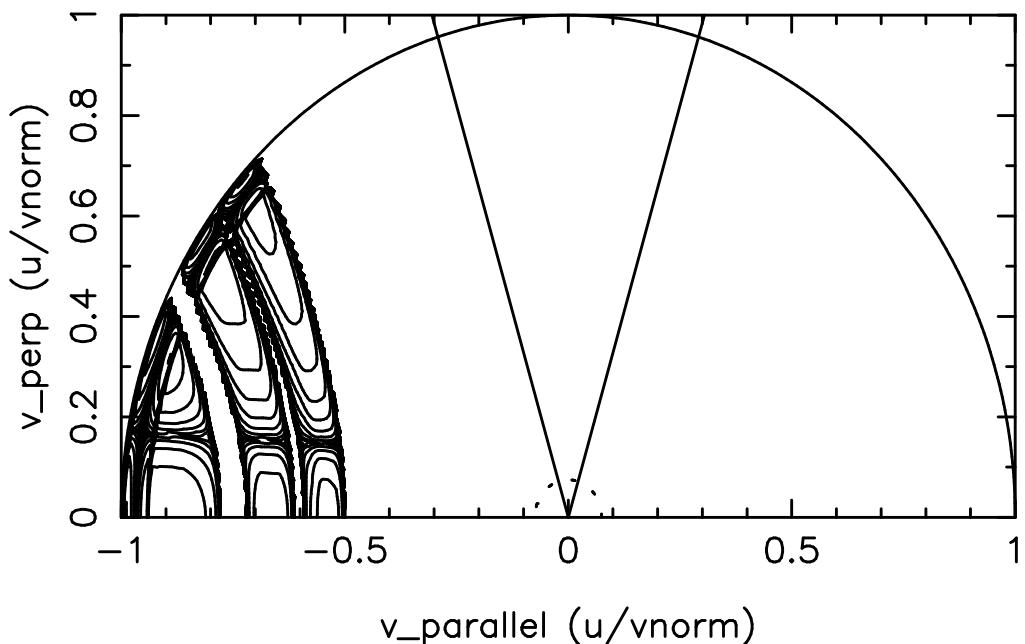
Contours of UrfB vs. v\_parallel,v\_perp



time step n= 99 time= 6.96E-01 secs  
r/a= 1.189E-01 radial position (R)= 1.8531E+02 cm  
rya= 1.189E-01 R=rpcon= 1.8531E+02 cm, Surf# 7

Contours of the rf (v,v) diffusion coefficient, urfb  
Flux surface number 7; all modes  
Max value for this surface/mode: 0.245E-01  
Species k=1

Contours of UrfB vs. v\_parallel,v\_perp



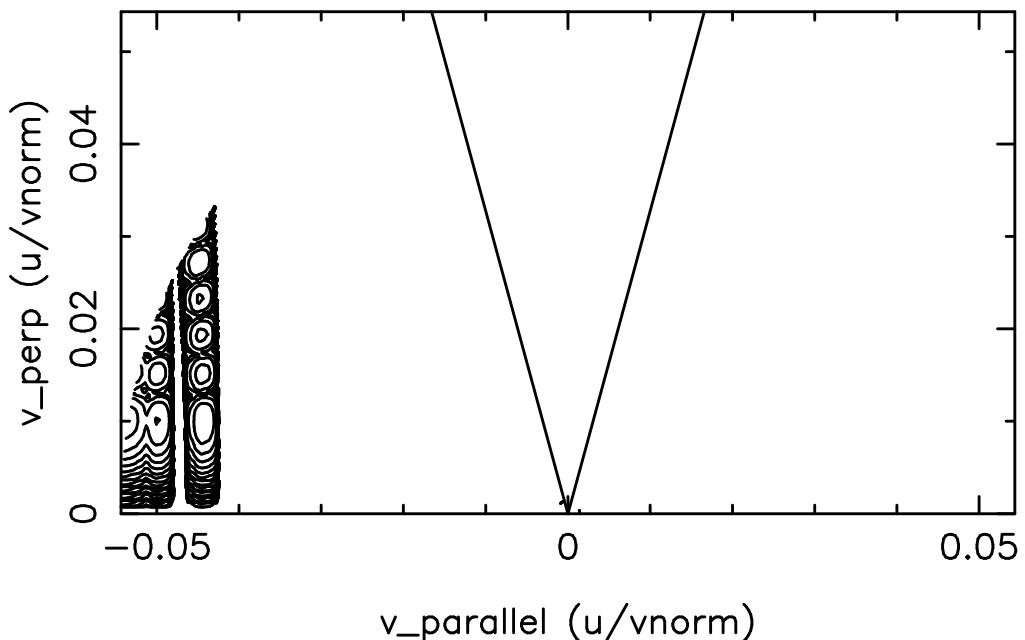
time step n= 99 time= 6.96E-01 secs  
r/a= 1.189E-01 radial position (R)= 1.8531E+02 cm  
rya= 1.189E-01 R=rpcon= 1.8531E+02 cm, Surf# 7

Contours of the rf (v,v) diffusion coefficient, urfb  
Flux surface number 7; all modes  
Max value for this surface/mode: 0.458E+02  
Species k=2

Contours of the rf (v,v) diffusion coefficient, urfb  
Flux surf.N 7; mode,nharm= 1 5; Species k=1  
Max value for this surface/mode: 0.390E-05

Contours of the rf (v,v) diffusion coefficient, urfb  
Flux surf.N 7; mode,nharm= 2 6; Species k=1  
Max value for this surface/mode: 0.100E-04

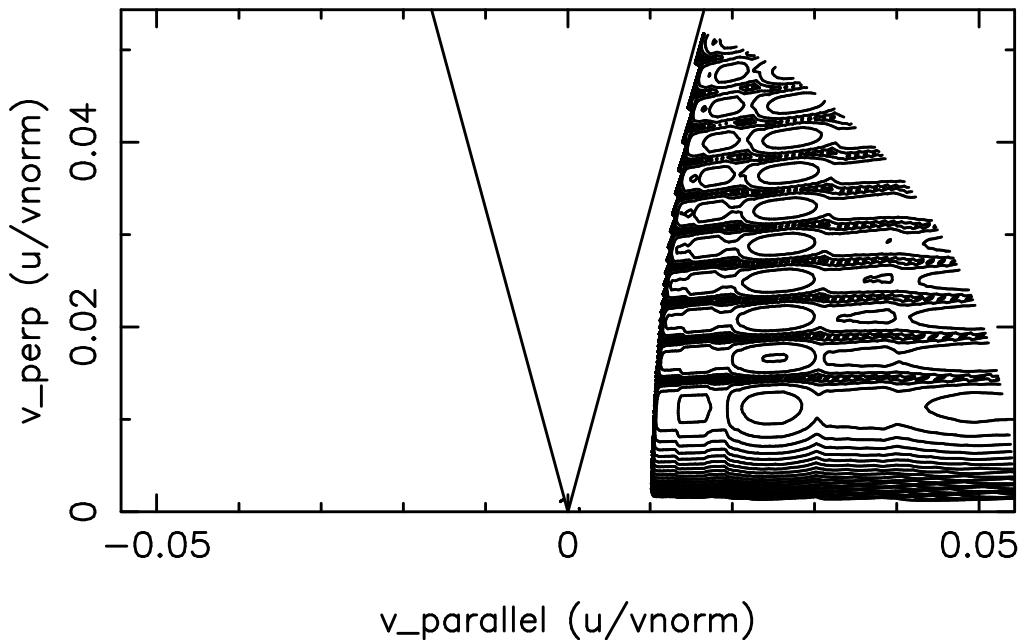
Contours of UrfB vs. v\_parallel,v\_perp



time step n= 99 time= 6.96E-01 secs  
r/a= 1.189E-01 radial position (R)= 1.8531E+02 cm  
rya= 1.189E-01 R=rpcon= 1.8531E+02 cm, Surf# 7

Contours of the rf (v,v) diffusion coefficient, urfb  
Flux surf.N 7; mode,nharm= 3 7; Species k=1  
Max value for this surface/mode: 0.266E-04

Contours of UrfB vs. v\_parallel,v\_perp

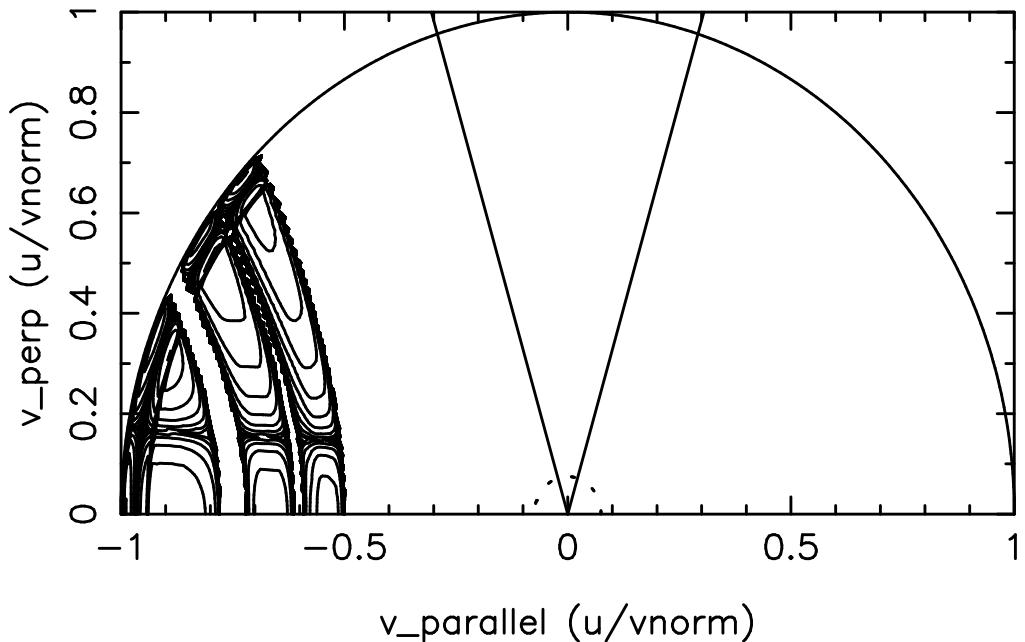


time step n= 99 time= 6.96E-01 secs  
r/a= 1.189E-01 radial position (R)= 1.8531E+02 cm  
rya= 1.189E-01 R=rpcon= 1.8531E+02 cm, Surf# 7

Contours of the rf (v,v) diffusion coefficient, urfb  
Flux surf.N 7; mode,nharm= 4 8; Species k=1  
Max value for this surface/mode: 0.838E-02

Contours of the rf (v,v) diffusion coefficient, urfb  
Flux surf.N 7; mode,nharm= 5 9; Species k=1  
Max value for this surface/mode: 0.245E-01

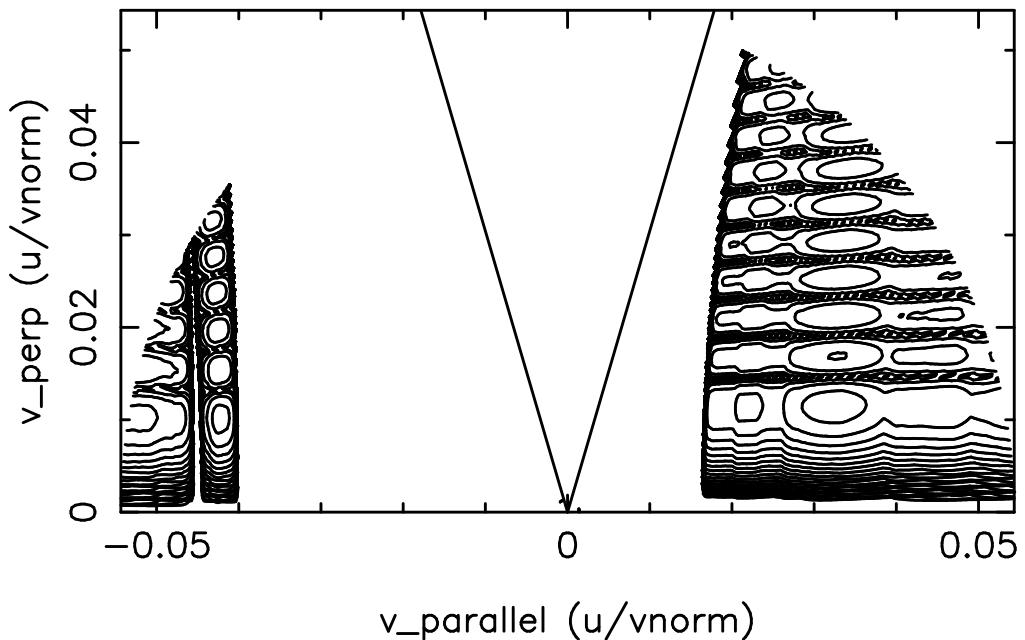
Contours of UrfB vs. v\_parallel,v\_perp



time step n= 99 time= 6.96E-01 secs  
r/a= 1.189E-01 radial position (R)= 1.8531E+02 cm  
rya= 1.189E-01 R=rpcon= 1.8531E+02 cm, Surf# 7

Contours of the rf (v,v) diffusion coefficient, urfb  
Flux surf.N 7; mode,nharm= 6 0; Species k=2  
Max value for this surface/mode: 0.458E+02

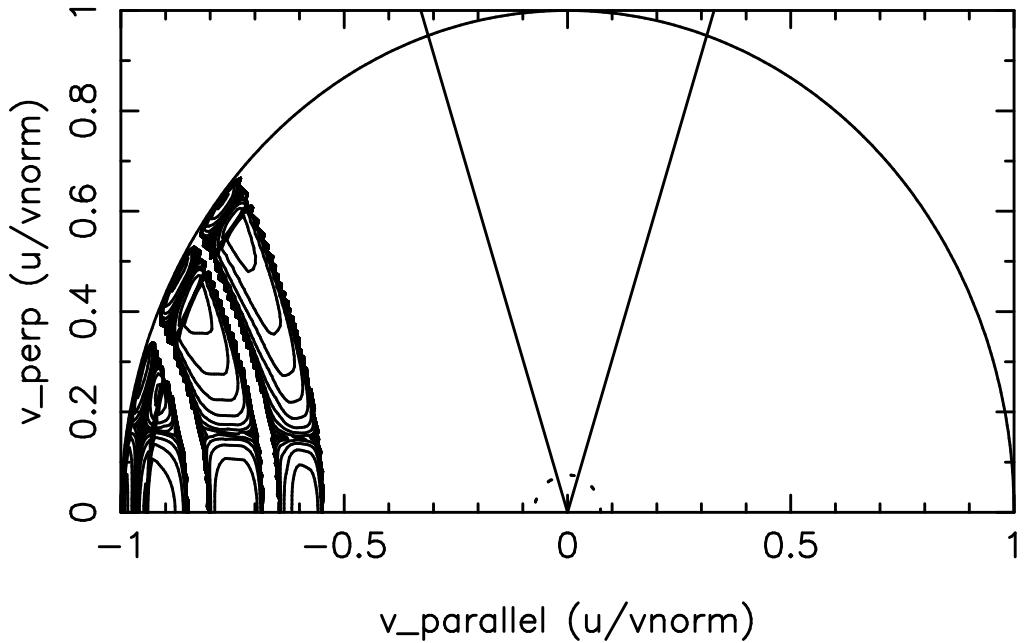
Contours of UrfB vs. v\_parallel,v\_perp



time step n= 99 time= 6.96E-01 secs  
r/a= 1.370E-01 radial position (R)= 1.8640E+02 cm  
rya= 1.370E-01 R=rpcon= 1.8640E+02 cm, Surf# 8

Contours of the rf (v,v) diffusion coefficient, urfb  
Flux surface number 8; all modes  
Max value for this surface/mode: 0.241E-01  
Species k=1

Contours of UrfB vs. v\_parallel,v\_perp



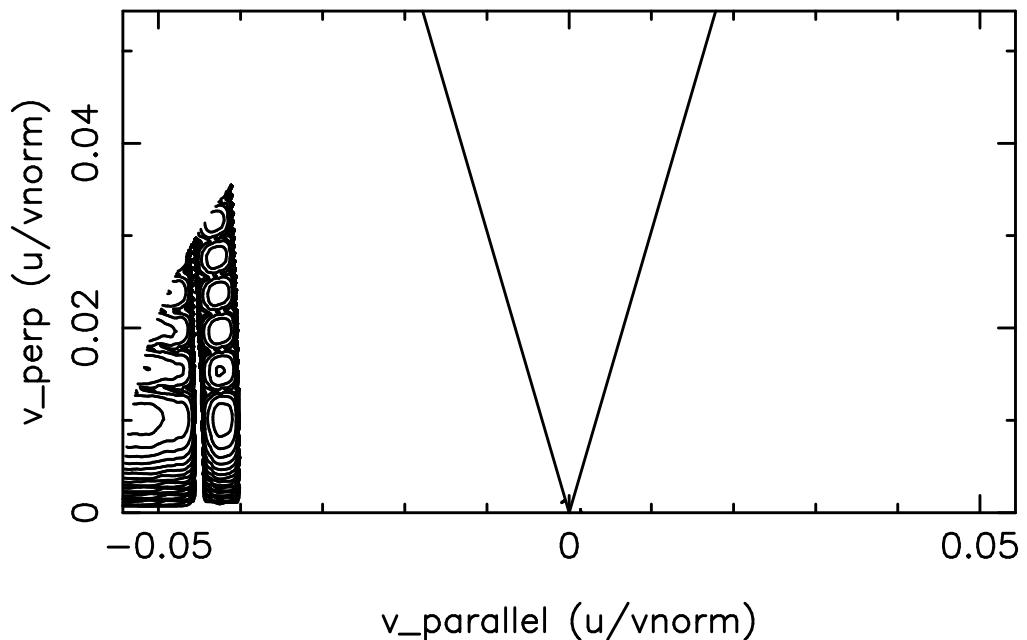
time step n= 99 time= 6.96E-01 secs  
r/a= 1.370E-01 radial position (R)= 1.8640E+02 cm  
rya= 1.370E-01 R=rpcon= 1.8640E+02 cm, Surf# 8

Contours of the rf (v,v) diffusion coefficient, urfb  
Flux surface number 8; all modes  
Max value for this surface/mode: 0.281E+02  
Species k=2

Contours of the rf (v,v) diffusion coefficient, urfb  
Flux surf.N 8; mode,nharm= 1 5; Species k=1  
Max value for this surface/mode: 0.347E-05

Contours of the rf (v,v) diffusion coefficient, urfb  
Flux surf.N 8; mode,nharm= 2 6; Species k=1  
Max value for this surface/mode: 0.829E-05

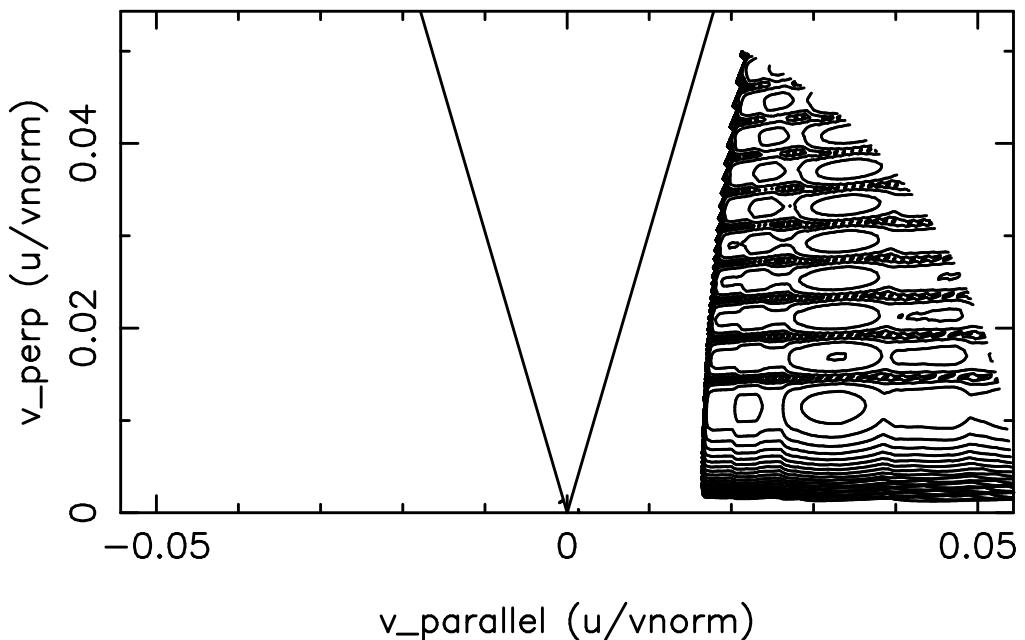
Contours of UrfB vs. v\_parallel,v\_perp



time step n= 99 time= 6.96E-01 secs  
r/a= 1.370E-01 radial position (R)= 1.8640E+02 cm  
rya= 1.370E-01 R=rpcon= 1.8640E+02 cm, Surf# 8

Contours of the rf (v,v) diffusion coefficient, urfb  
Flux surf.N 8; mode,nharm= 3 7; Species k=1  
Max value for this surface/mode: 0.316E-04

Contours of UrfB vs. v\_parallel,v\_perp

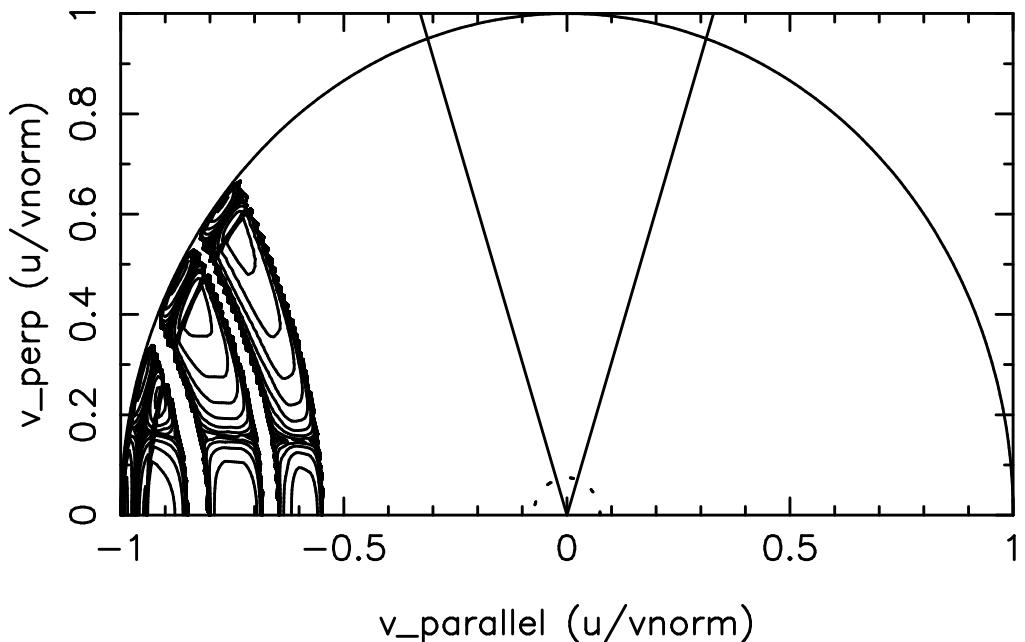


time step n= 99 time= 6.96E-01 secs  
r/a= 1.370E-01 radial position (R)= 1.8640E+02 cm  
rya= 1.370E-01 R=rpcon= 1.8640E+02 cm, Surf# 8

Contours of the rf (v,v) diffusion coefficient, urfb  
Flux surf.N 8; mode,nharm= 4 8; Species k=1  
Max value for this surface/mode: 0.599E-02

Contours of the rf (v,v) diffusion coefficient, urfb  
Flux surf.N 8; mode,nharm= 5 9; Species k=1  
Max value for this surface/mode: 0.241E-01

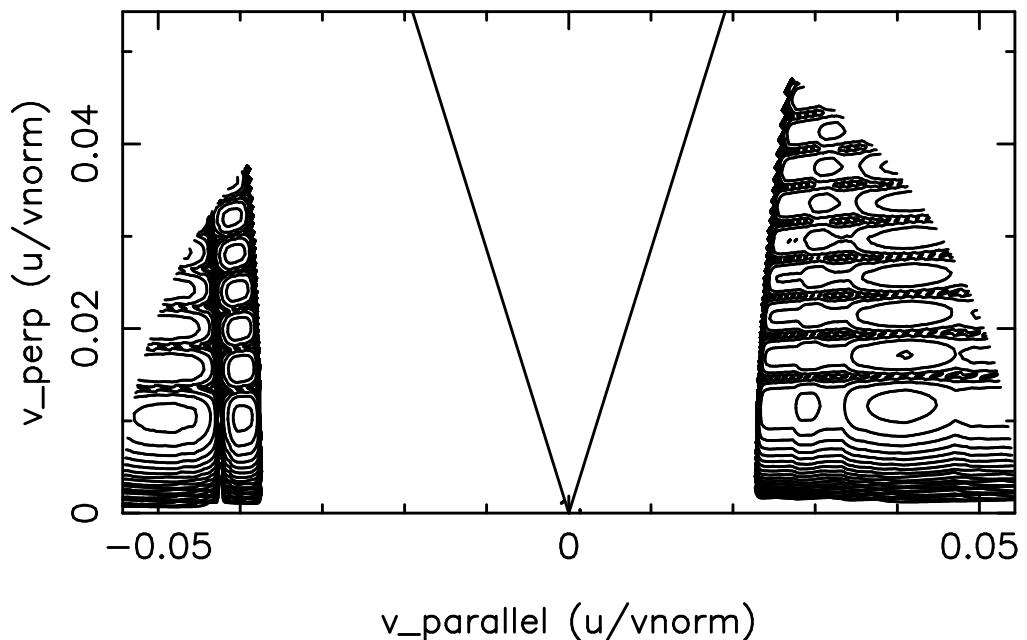
Contours of UrfB vs. v\_parallel,v\_perp



time step n= 99 time= 6.96E-01 secs  
r/a= 1.370E-01 radial position (R)= 1.8640E+02 cm  
rya= 1.370E-01 R=rpcon= 1.8640E+02 cm, Surf# 8

Contours of the rf (v,v) diffusion coefficient, urfb  
Flux surf.N 8; mode,nharm= 6 0; Species k=2  
Max value for this surface/mode: 0.281E+02

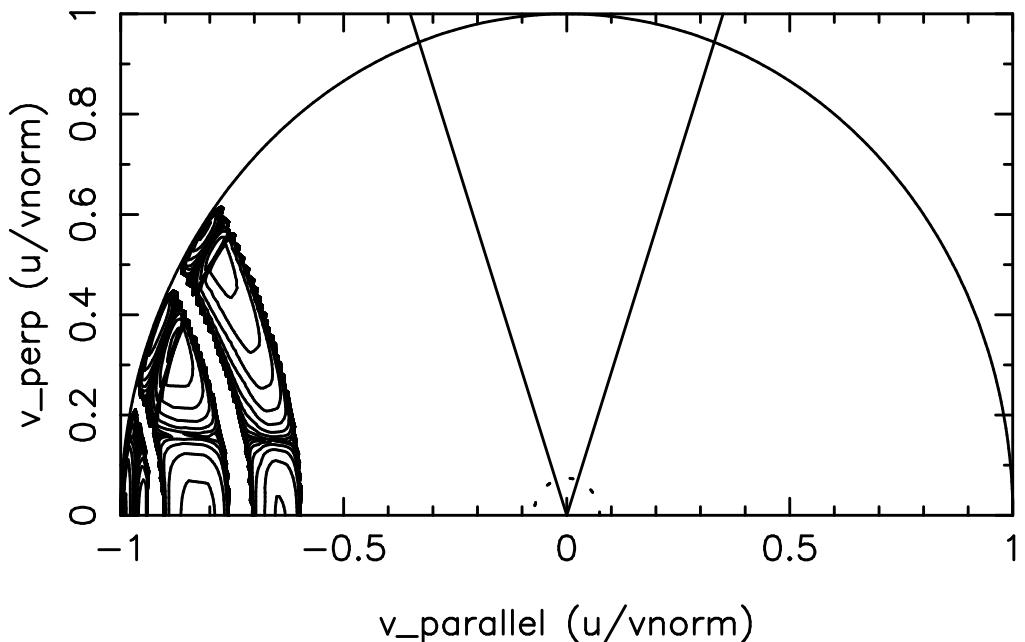
Contours of UrfB vs. v\_parallel,v\_perp



time step n= 99 time= 6.96E-01 secs  
r/a= 1.552E-01 radial position (R)= 1.8747E+02 cm  
rya= 1.552E-01 R=rpcon= 1.8747E+02 cm, Surf# 9

Contours of the rf (v,v) diffusion coefficient, urfb  
Flux surface number 9; all modes  
Max value for this surface/mode: 0.242E-01  
Species k=1

Contours of UrfB vs. v\_parallel,v\_perp



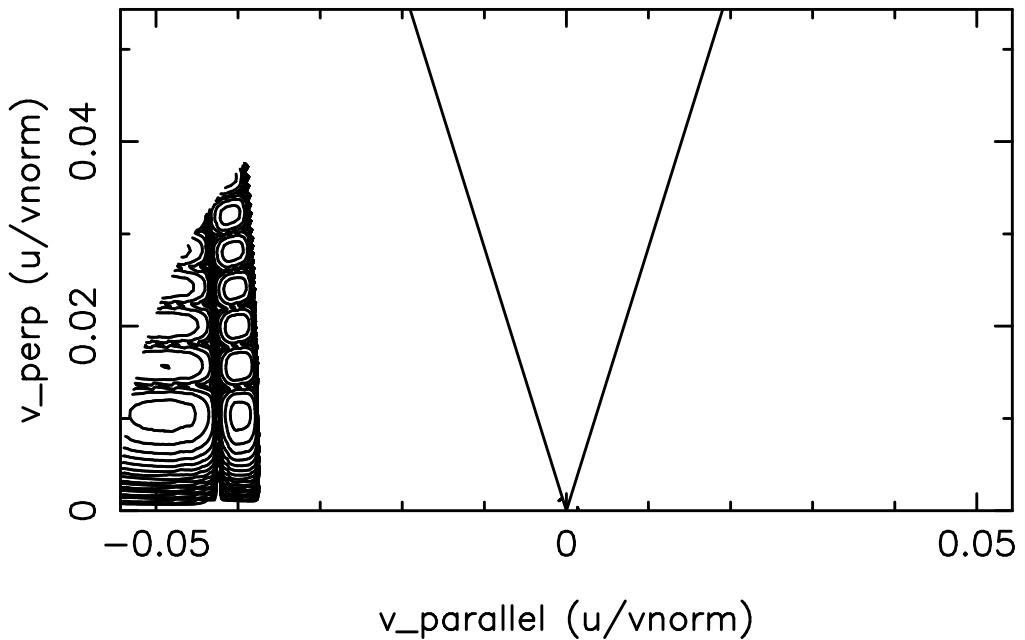
time step n= 99 time= 6.96E-01 secs  
r/a= 1.552E-01 radial position (R)= 1.8747E+02 cm  
rya= 1.552E-01 R=rpcon= 1.8747E+02 cm, Surf# 9

Contours of the rf (v,v) diffusion coefficient, urfb  
Flux surface number 9; all modes  
Max value for this surface/mode: 0.166E+02  
Species k=2

Contours of the rf (v,v) diffusion coefficient, urfb  
Flux surf.N 9; mode,nharm= 1 5; Species k=1  
Max value for this surface/mode: 0.327E-05

Contours of the rf (v,v) diffusion coefficient, urfb  
Flux surf.N 9; mode,nharm= 2 6; Species k=1  
Max value for this surface/mode: 0.896E-05

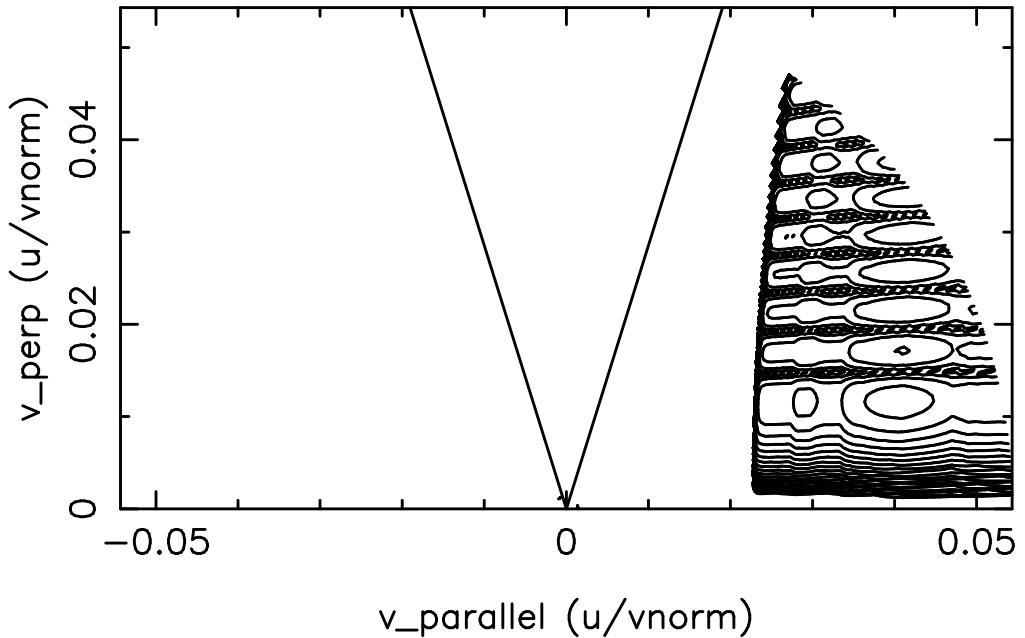
Contours of UrfB vs. v\_parallel,v\_perp



time step n= 99 time= 6.96E-01 secs  
r/a= 1.552E-01 radial position (R)= 1.8747E+02 cm  
rya= 1.552E-01 R=rpcon= 1.8747E+02 cm, Surf# 9

Contours of the rf (v,v) diffusion coefficient, urfb  
Flux surf.N 9; mode,nharm= 3 7; Species k=1  
Max value for this surface/mode: 0.320E-04

Contours of UrfB vs. v\_parallel,v\_perp

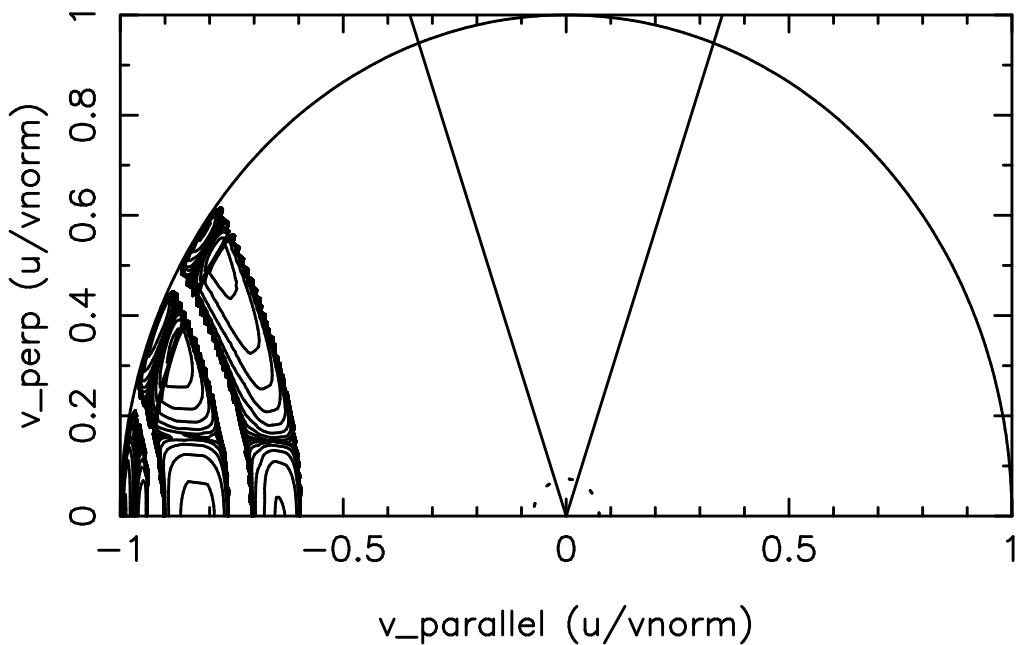


time step n= 99 time= 6.96E-01 secs  
r/a= 1.552E-01 radial position (R)= 1.8747E+02 cm  
rya= 1.552E-01 R=rpcon= 1.8747E+02 cm, Surf# 9

Contours of the rf (v,v) diffusion coefficient, urfb  
Flux surf.N 9; mode,nharm= 4 8; Species k=1  
Max value for this surface/mode: 0.777E-02

Contours of the rf (v,v) diffusion coefficient, urfb  
Flux surf.N 9; mode,nharm= 5 9; Species k=1  
Max value for this surface/mode: 0.242E-01

Contours of UrfB vs. v\_parallel,v\_perp

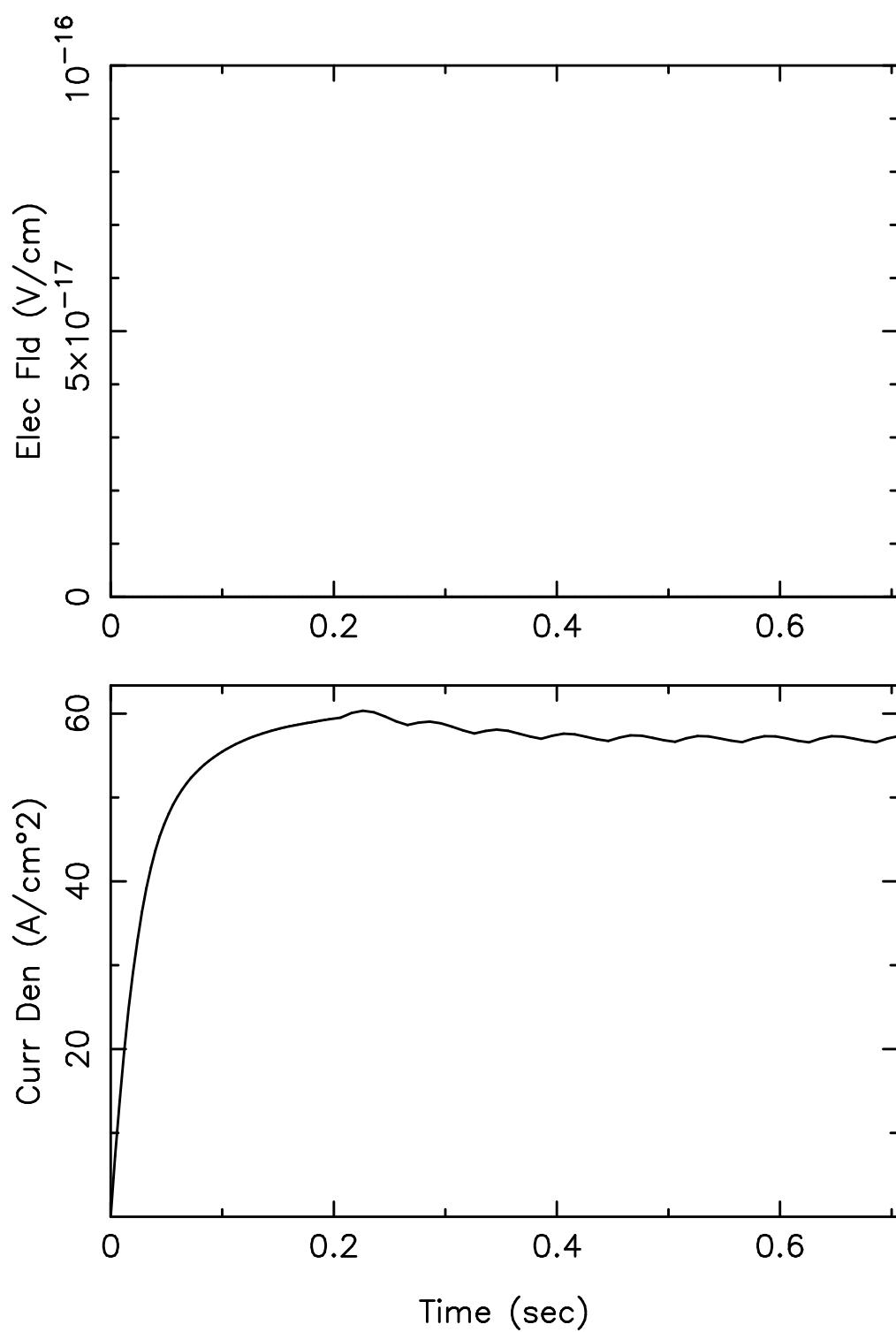


time step n= 99 time= 6.96E-01 secs  
r/a= 1.552E-01 radial position (R)= 1.8747E+02 cm  
rya= 1.552E-01 R=rpcon= 1.8747E+02 cm, Surf# 9

Contours of the rf (v,v) diffusion coefficient, urfb  
Flux surf.N 9; mode,nharm= 6 0; Species k=2  
Max value for this surface/mode: 0.166E+02

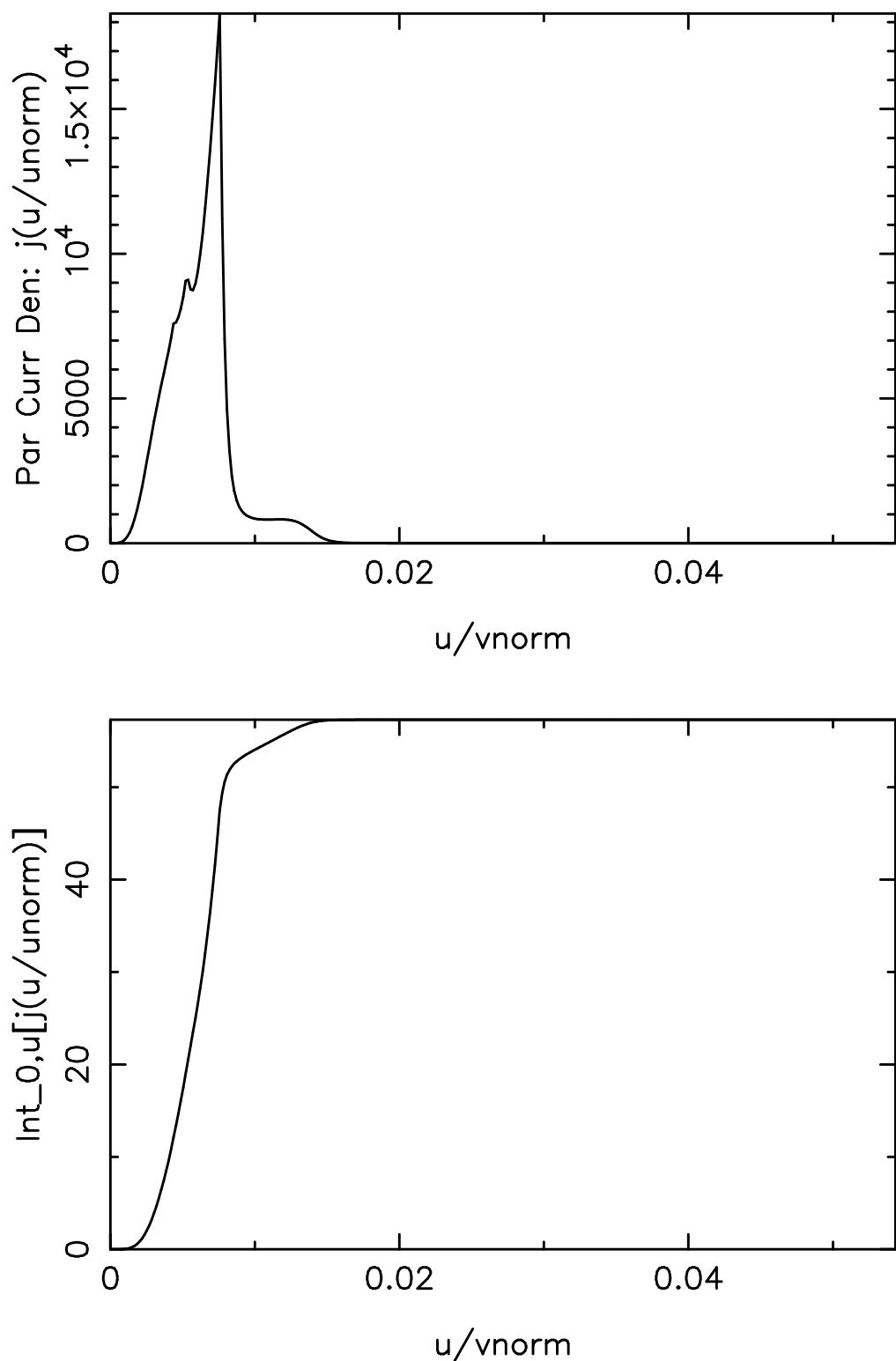
## LOCAL RADIAL QUANTITIES

```
time step n= 100,      time= 7.0600E-01 secs
flux surf= 5      total flux surfs= 55
r/a= 8.259E-02      radial position (R)= 1.8308E+02 cms
rya= 8.259E-02      R=rpcon= 1.831E+02 cm
enormi, enorme(=enorm) (kev) = 3250.000      300.000
vnorm/c = 1.2324136
vthe (sqrt(te/me))/c = 0.0926848
vthe/vnorm = 0.0752059
k= 1 vth(k)/vnorm = 0.0014334
k= 2 vth(k)/vnorm = 0.0752059
k= 3 vth(k)/vnorm = 0.0014334
k= 4 vth(k)/vnorm = 0.0001432
k= 5 vth(k)/vnorm = 0.0752059
```

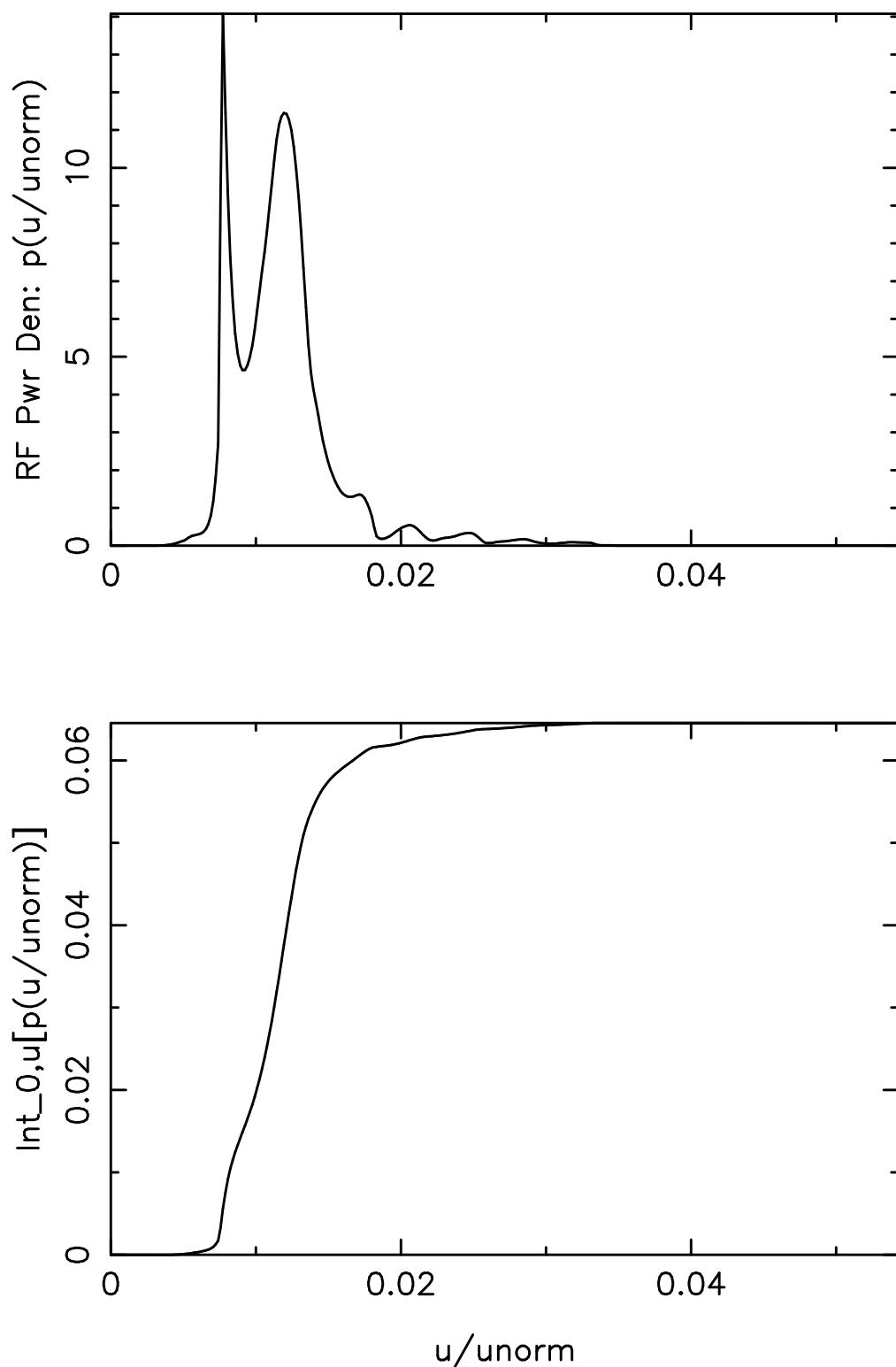


Electric field = 0.0000E+00 (V/cm)  
FSA current den of species 1 = 5.7296E+01 Amps/cm\*\*2

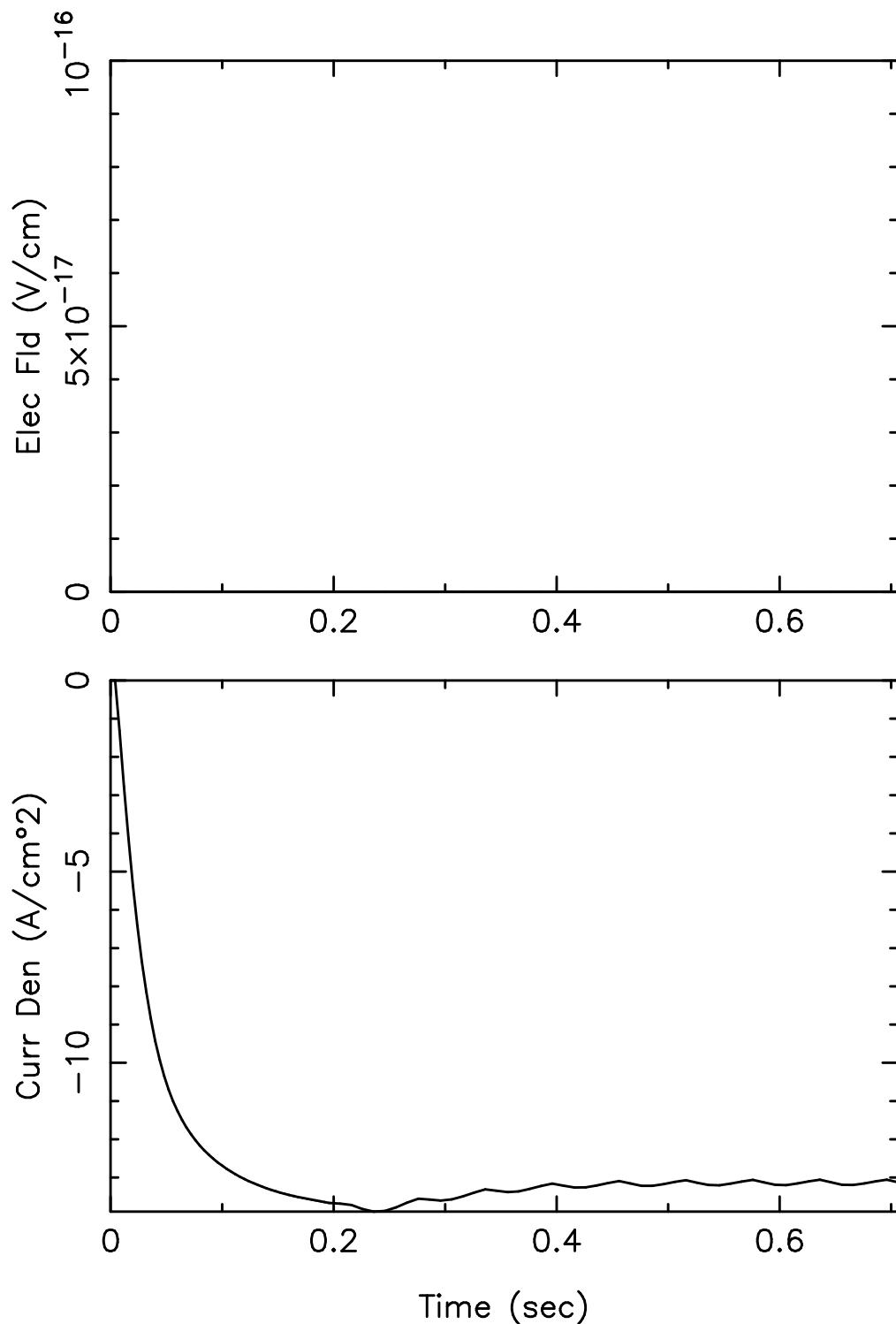
Current drive efficiency  $j/(2\pi R \rho r_f)$  = 7.9682E-01 A/W



Species: 1 Current = $0.5730E+02$  Amps/cm $^2$

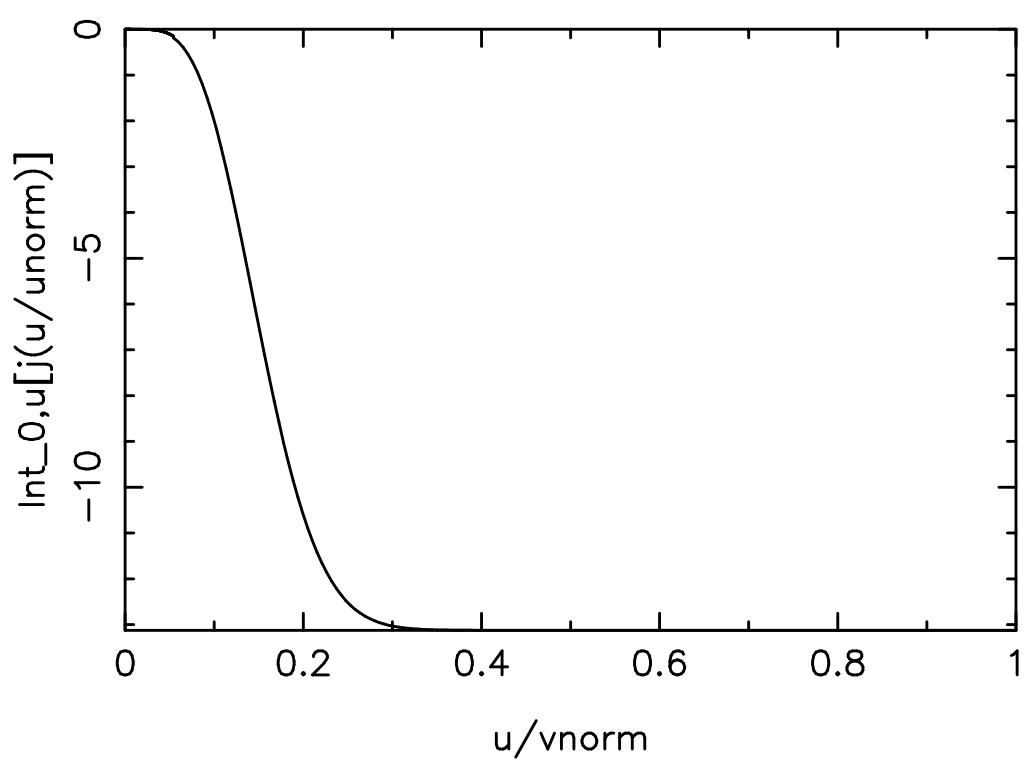
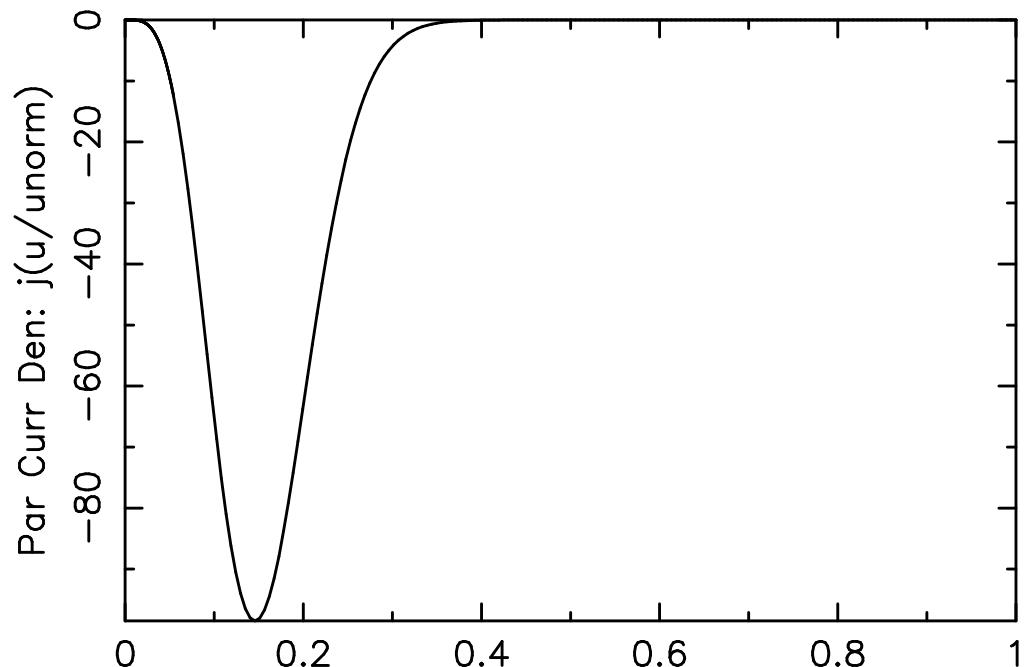


Species: 1 Power =0.6454E-01 Watts/cc

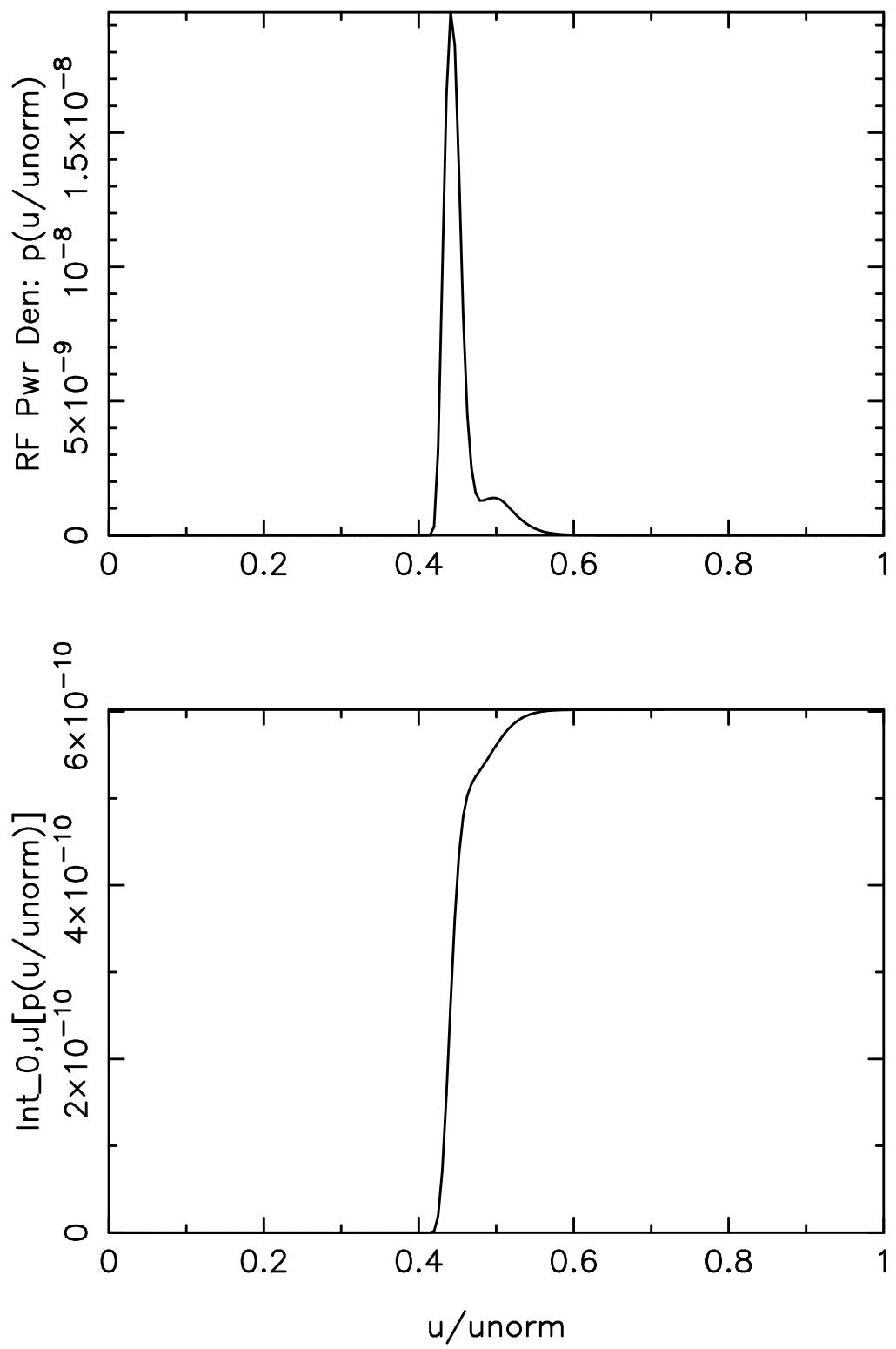


Electric field = 0.0000E+00 (V/cm)  
 FSA current den of species 2 = -1.3125E+01 Amps/cm\*\*2

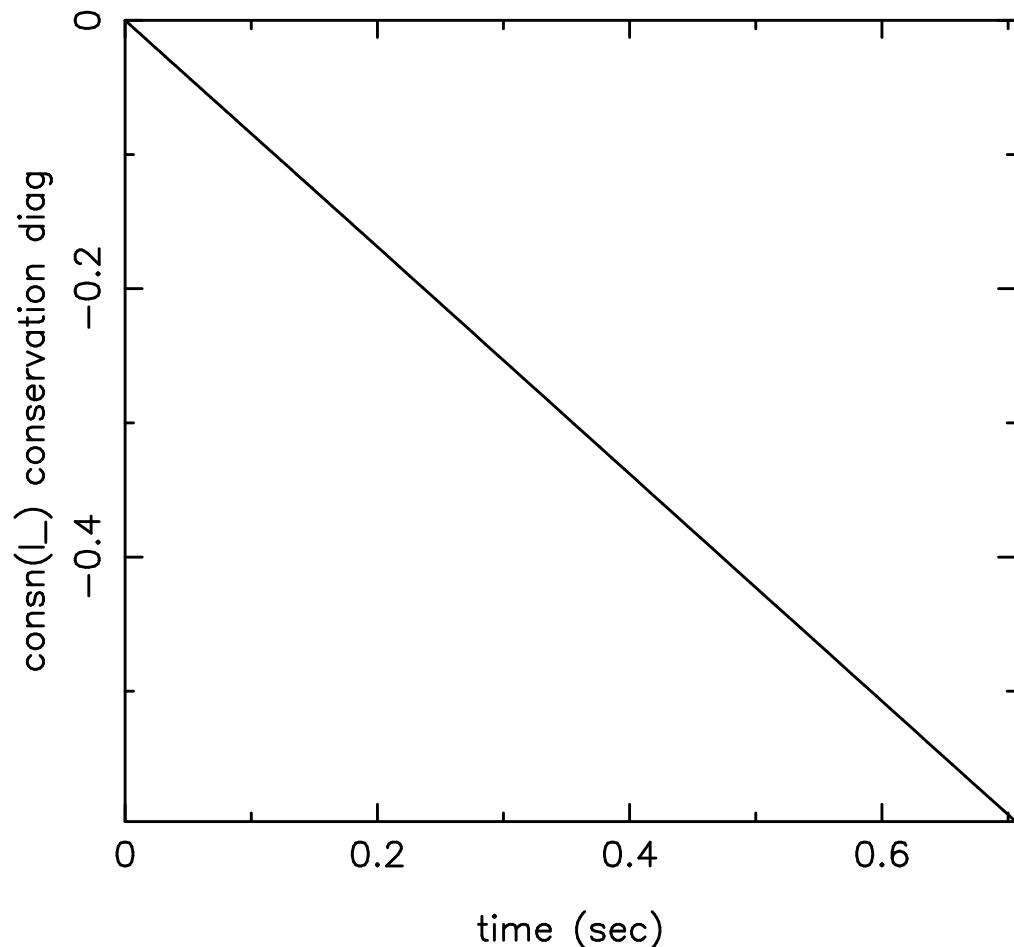
Current drive efficiency  $j/(2\pi R \cdot prf)$  = -1.9565E+07 A/W  
 Electron current (units  $ne \cdot q \cdot vth(kelec, lr_*)$ ) = -4.9624E-04  
 power (units:  $ne \cdot vth(kelec, lr_*)^2 \cdot 2 \cdot me \cdot nu0$ ) = 1.8958E-13  
 efficiency ( $j/p$ ) (Fisch 1978 units) = -2.6176E+09  
 efficiency ( $j/p$ ) ( $e/(m \cdot c \cdot nu_c)$  units) = -2.2487E+07  
 $vth(kelec, lr_*) = \sqrt{T/m}$  = 2.7786E+09 cm/sec  
 $nu0 = 7.5946E+04$  Hz



Species: 2 Current =-.1313E+02 Amps/cm<sup>2</sup>



Species: 2 Power = $0.6021\text{E}-09$  Watts/cc

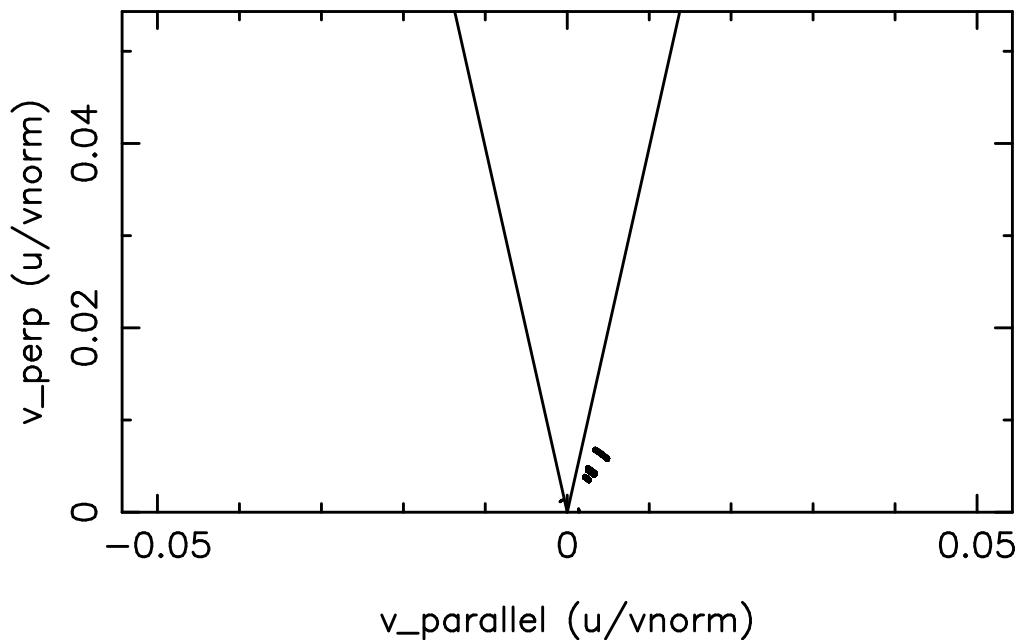


consn(l\_)= -5.9705E-01

Perfect conservation should yield machine accuracy,  
or about 1.e-14:

time step (n) is 100      time= 7.0600E-01 secs  
r/a= 8.2593E-02      radial position (R) = 1.8308E+02 cm

Species 1 Source Function (units: dist. f/sec)



time step n= 100      time= 7.06E-01 secs  
 $r/a = 8.259E-02$       radial position (R)= 1.8308E+02 cm  
 $rya = 8.259E-02$       R=rpcon= 1.8308E+02 cm, Surf# 5

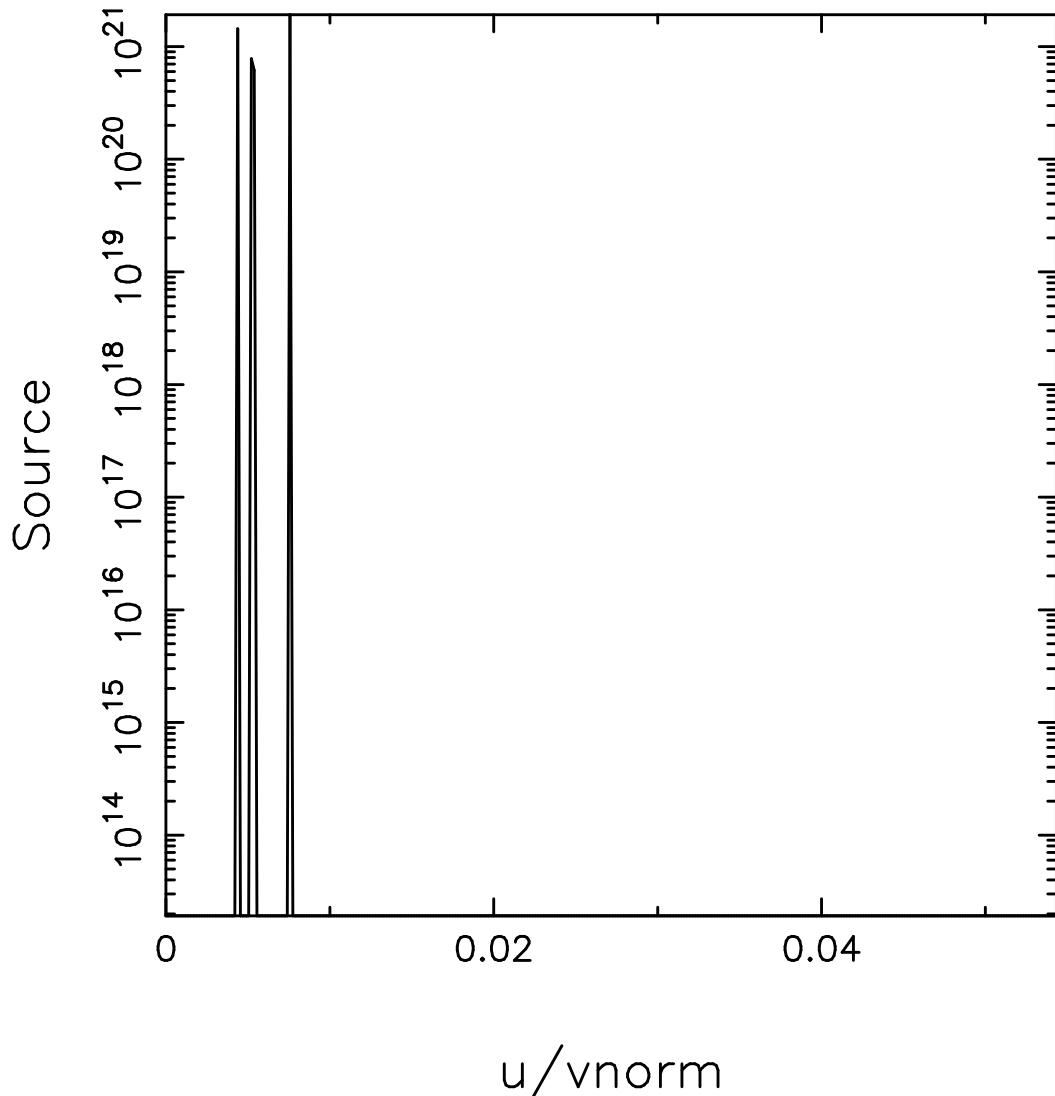
Particle source rate= 1.0069E+14 ptcls/cc/sec

Total source power [entr(..5..)]= 1.0308E+00 W/cc

Contour values:

1.9264E+10	7.6691E+10	3.0531E+11	1.2155E+12
4.8389E+12	1.9264E+13	7.6691E+13	3.0531E+14
1.2155E+15	4.8389E+15	1.9264E+16	7.6691E+16
3.0531E+17	1.2155E+18	4.8389E+18	1.9264E+19
7.6691E+19	3.0531E+20	1.2155E+21	4.8389E+21

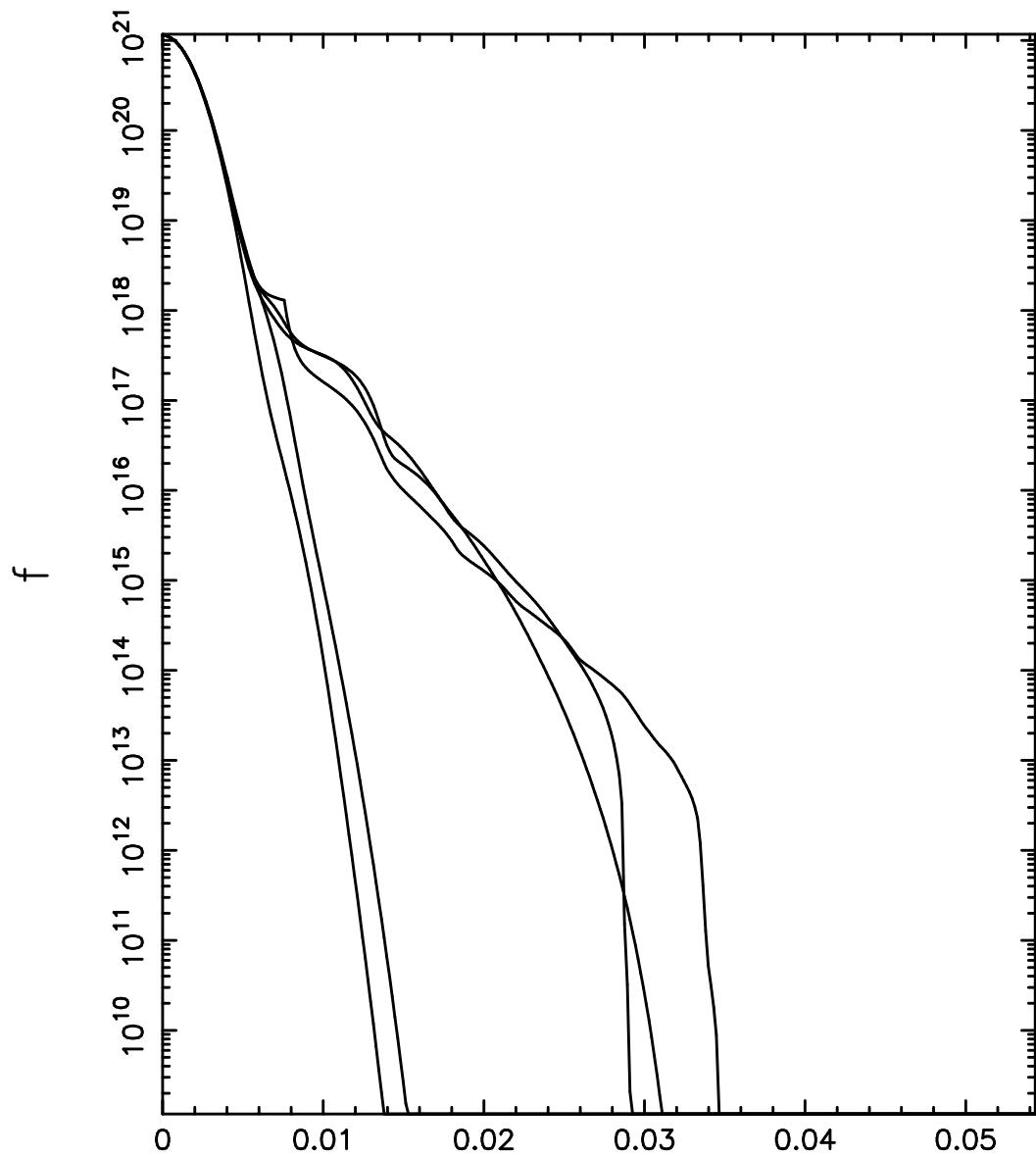
## Pitch Angle Avg Source vs. u



Particle source integrated over theta0 for species 1  
(normed so int(0,1)\*2pi\*x\*\*2\*dx=mid-plane source)  
vnorm= 3.6947E+10 cm/s

time step (n) is 100 time= 7.0600E-01 secs  
r/a= 8.2593E-02 radial position (R) = 1.8308E+02 cm

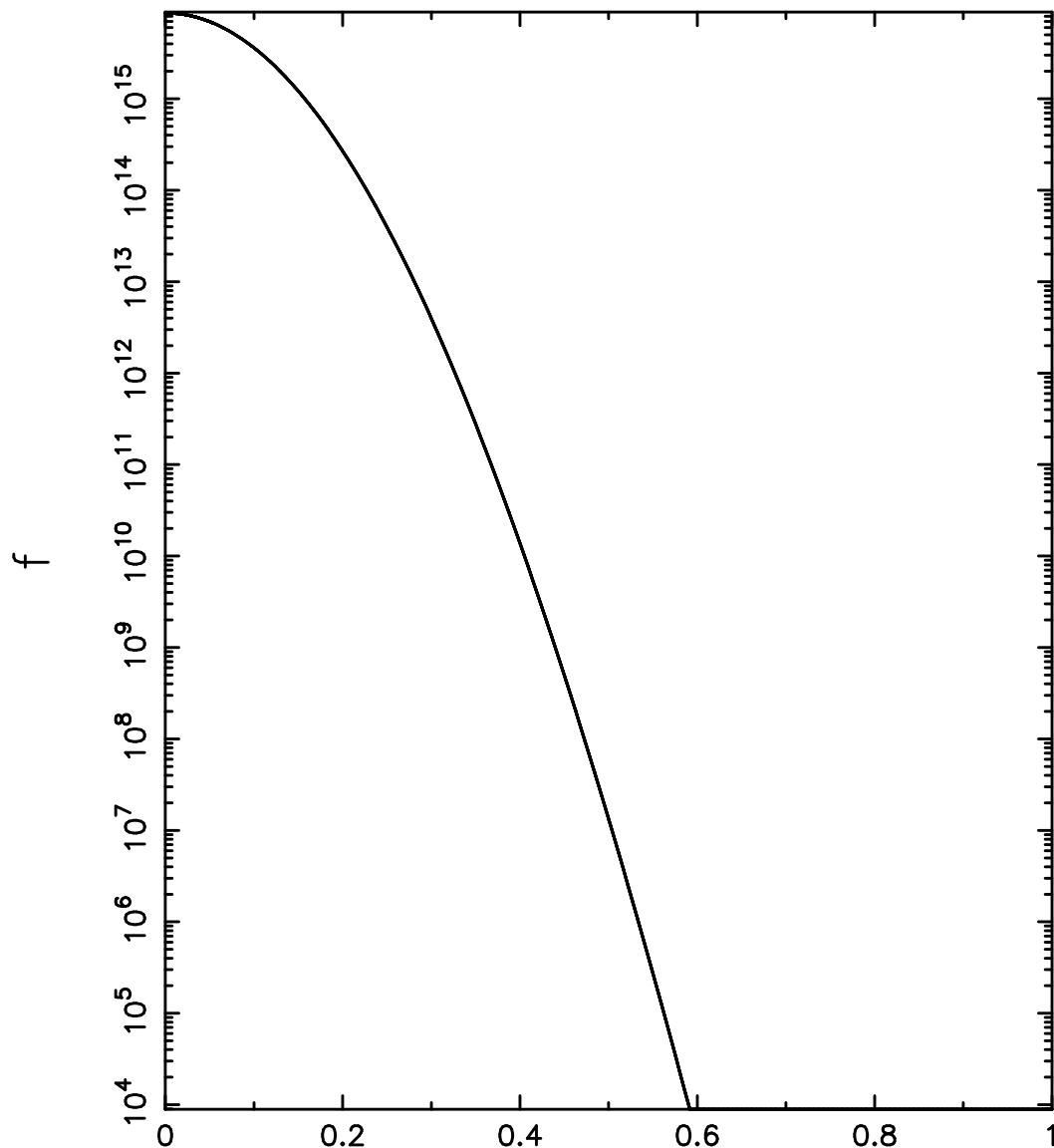
## Cuts of $f$ vs. $v$ , at cnst pitch angle



$u/v_{\text{norm}}$

Distribution function vs. velocity for some angles  
Species number=1, enorm= 3.00D+02  
time step (n)= 100 time= 0.706000E+00 secs  
 $r/a = 8.26E-02$  radial position( $R$ )= 1.831E+02 cm

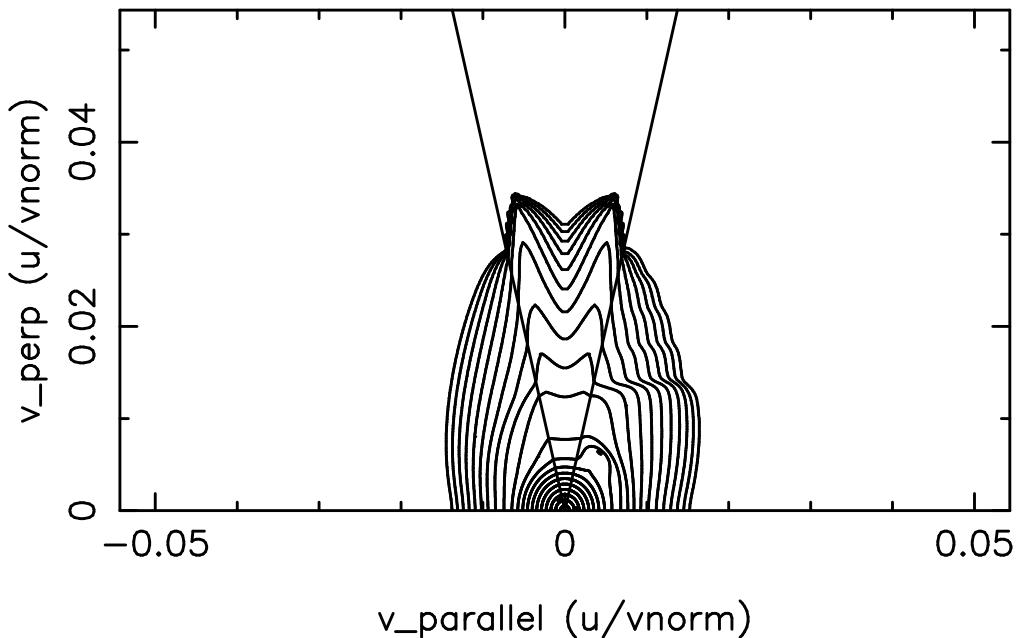
## Cuts of $f$ vs. $v$ , at cnst pitch angle



$u/v_{\text{norm}}$

Distribution function vs. velocity for some angles  
Species number=2, enorm= 3.00D+02  
time step (n)= 100 time= 0.706000E+00 secs  
r/a= 8.26E-02 radial position(R)= 1.831E+02 cm

### Species 1 Distribution Function Contour Plot

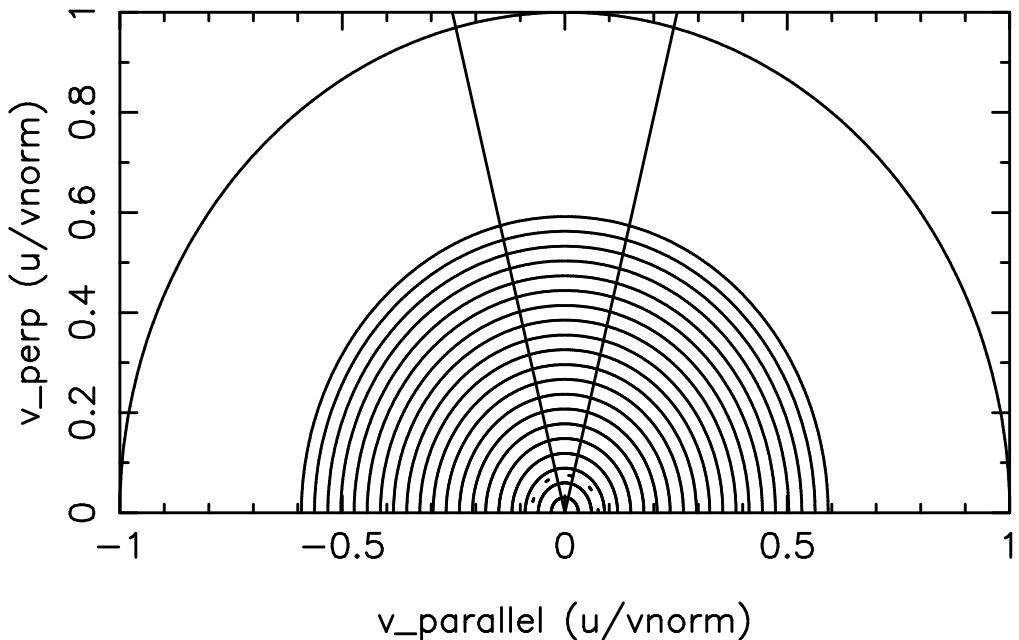


time step n= 100      time= 7.06E-01 secs  
 $r/a = 8.259E-02$       radial position ( $R$ )= 1.8308E+02 cm  
 $rya = 8.259E-02$        $R=rpcon= 1.8308E+02$  cm, Surf# 5

Contour values:

1.053563E+21	8.291945E+20	5.571157E+20	3.202231E+20
1.579208E+20	6.706106E+19	2.462505E+19	7.856251E+18
2.188880E+18	5.355150E+17	1.157006E+17	2.220455E+16
3.807508E+15	5.867782E+14	8.174260E+13	1.035178E+13
1.198258E+12	1.274517E+11	1.251974E+10	1.141279E+09

### Species 2 Distribution Function Contour Plot



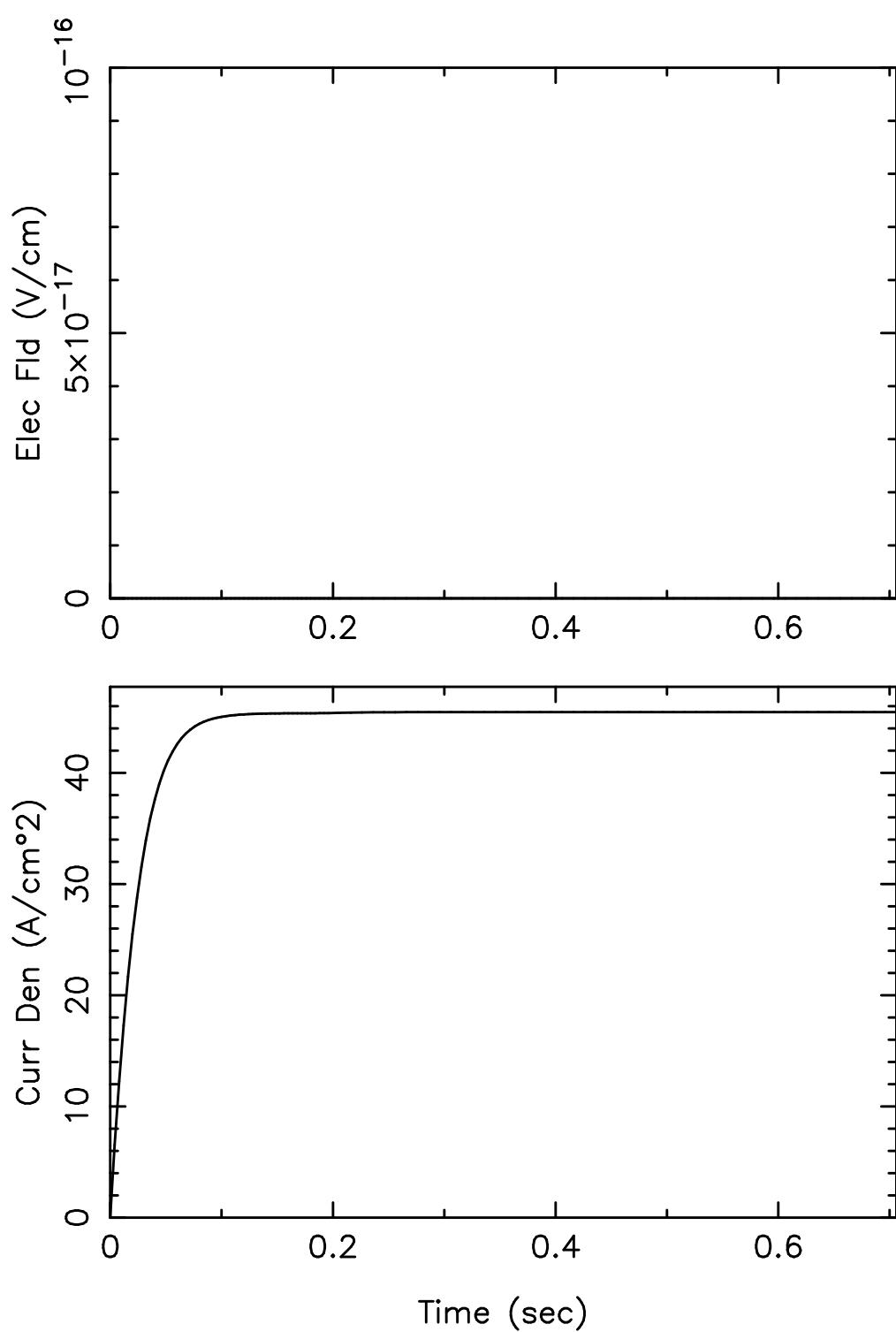
time step n= 100      time= 7.06E-01 secs  
 $r/a = 8.259E-02$       radial position (R)= 1.8308E+02 cm  
 $rya = 8.259E-02$       R=rpcon= 1.8308E+02 cm, Surf# 5

Contour values:

8.000598E+15	6.347573E+15	4.320407E+15	2.526541E+15
1.272065E+15	5.528370E+14	2.080267E+14	6.801244E+13
1.939440E+13	4.843808E+12	1.064219E+12	2.066335E+11
3.562416E+10	5.479568E+09	7.556193E+08	9.386584E+07
1.055437E+07	1.079233E+06	1.008205E+05	8.643144E+03

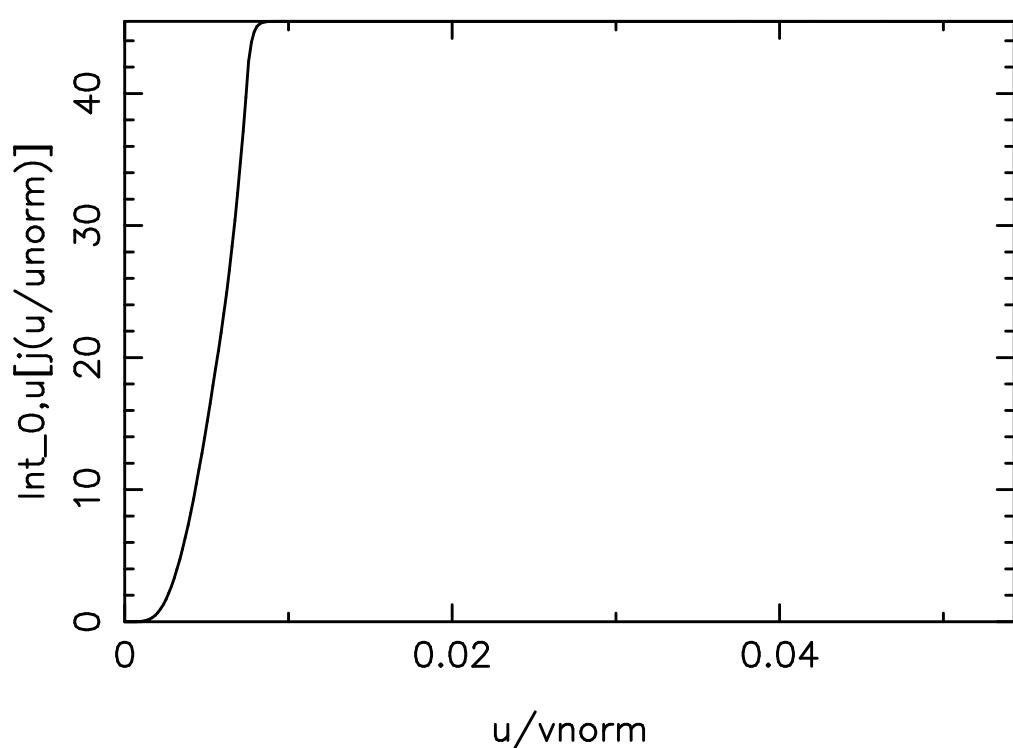
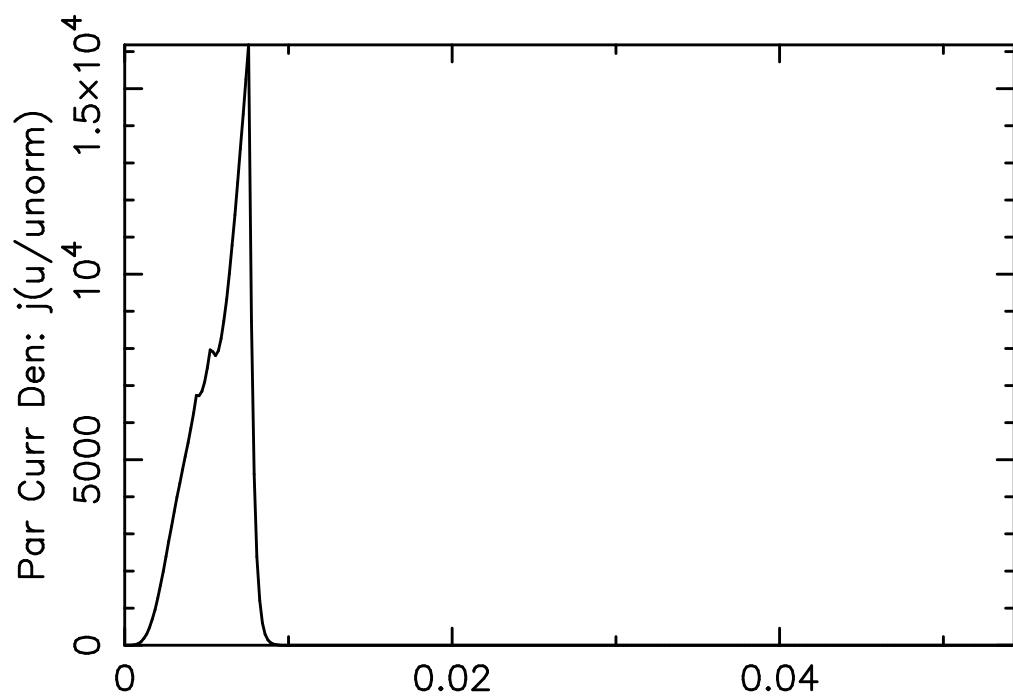
## LOCAL RADIAL QUANTITIES

time step n= 100, time= 7.0600E-01 secs  
flux surf= 7 total flux surfs= 55  
r/a= 1.189E-01 radial position (R)= 1.8531E+02 cms  
rya= 1.189E-01 R=rpcon= 1.853E+02 cm  
enormi, enorme(=enorm) (kev) = 3250.000 300.000  
vnorm/c = 1.2324136  
vthe (sqrt(te/me))/c = 0.0921028  
vthe/vnorm = 0.0747337  
k= 1 vth(k)/vnorm = 0.0014244  
k= 2 vth(k)/vnorm = 0.0747337  
k= 3 vth(k)/vnorm = 0.0014244  
k= 4 vth(k)/vnorm = 0.0001423  
k= 5 vth(k)/vnorm = 0.0747337

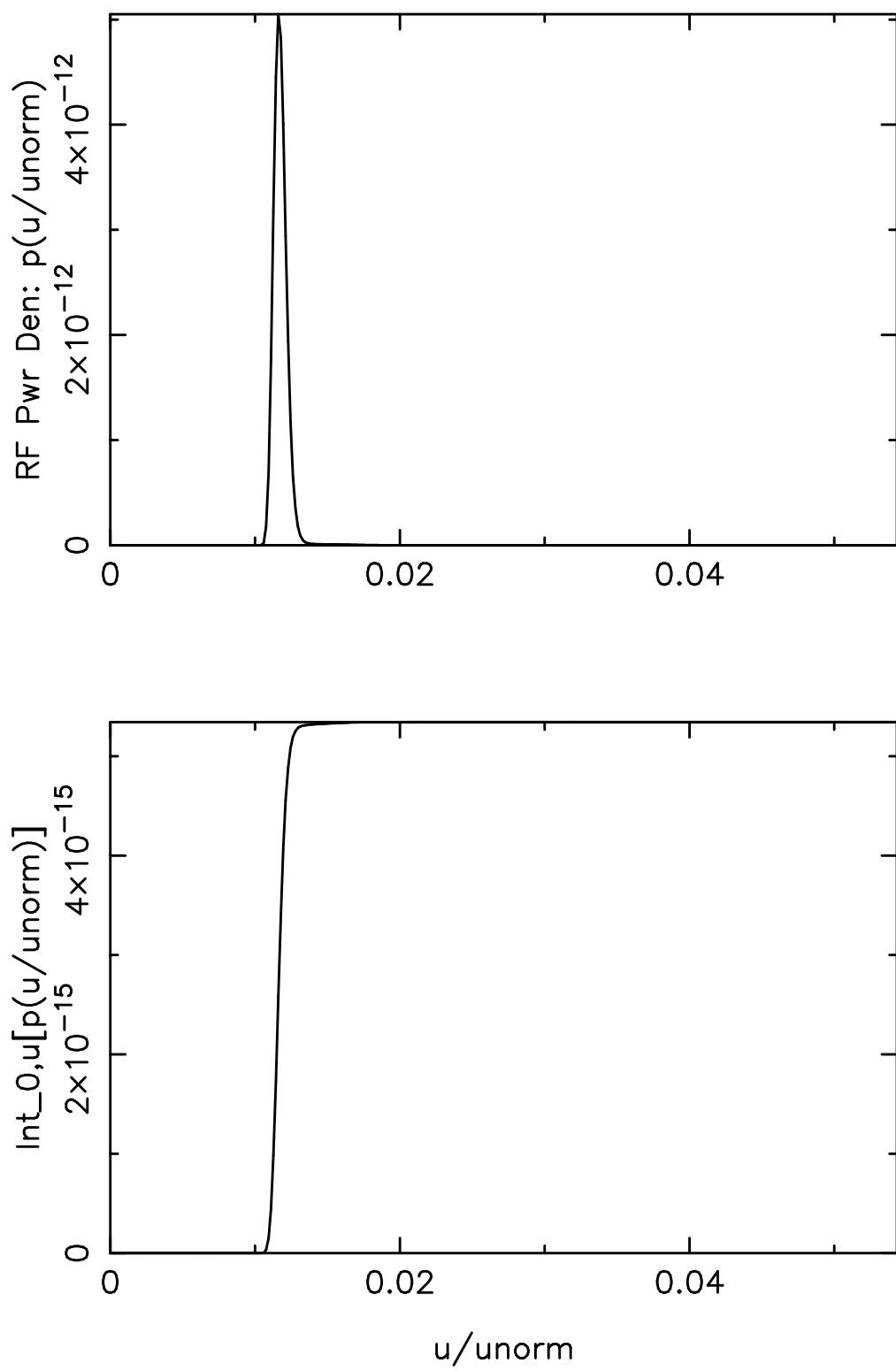


Electric field = 0.0000E+00 (V/cm)  
FSA current den of species 1 = 4.5462E+01 Amps/cm\*\*2

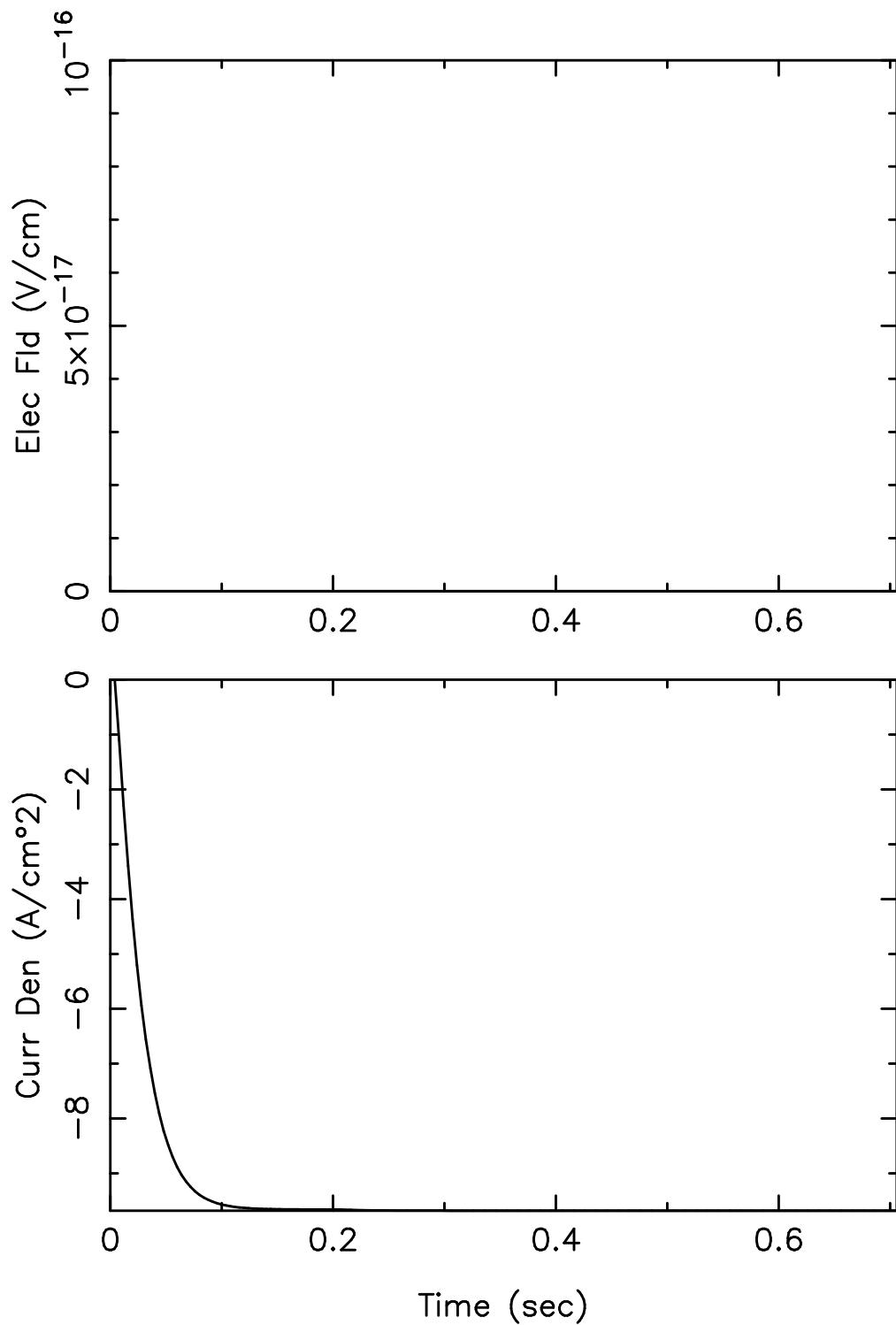
Current drive efficiency  $j/(2\pi R \rho r_f)$  = 7.6550E+12 A/W



Species: 1 Current =  $0.4546E+02$  Amps/cm<sup>2</sup>

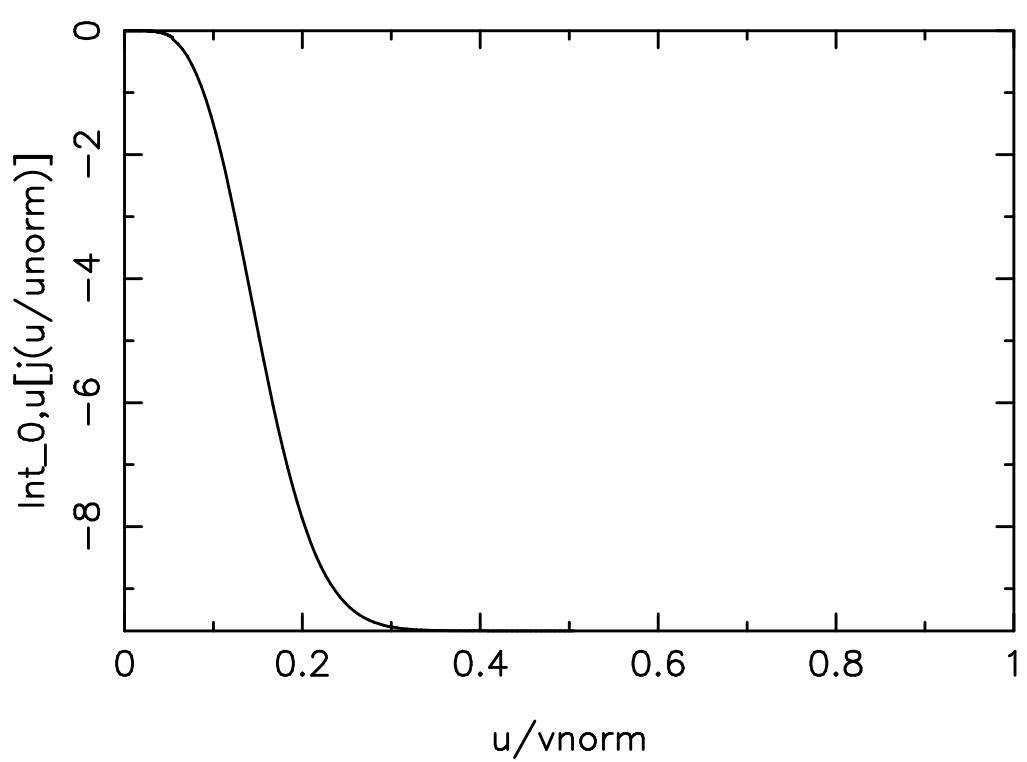
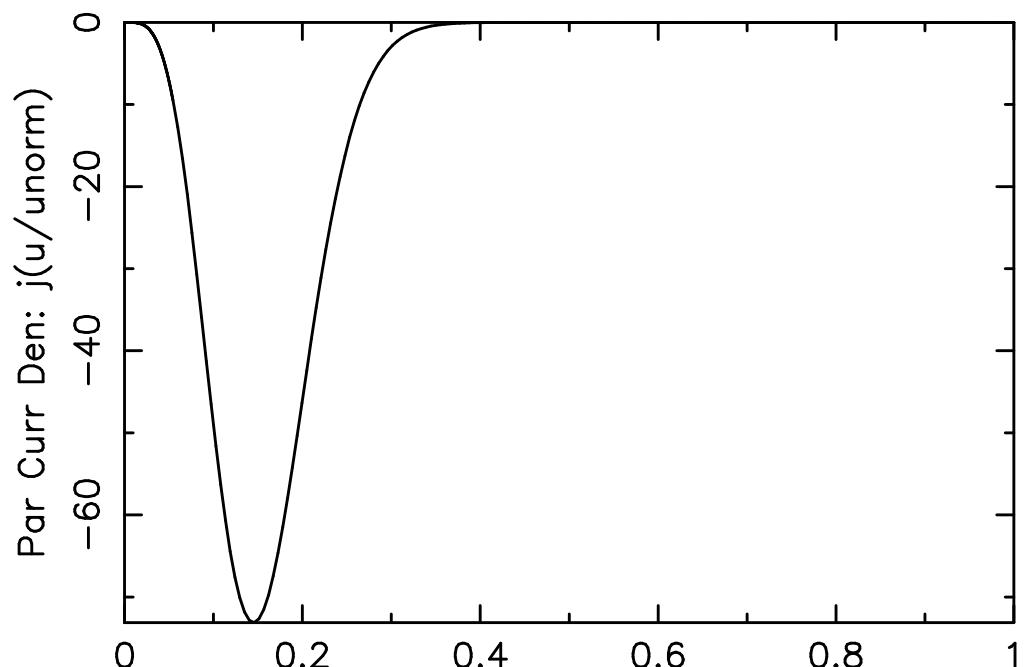


Species: 1 Power = $0.5343\text{E-}14$  Watts/cc

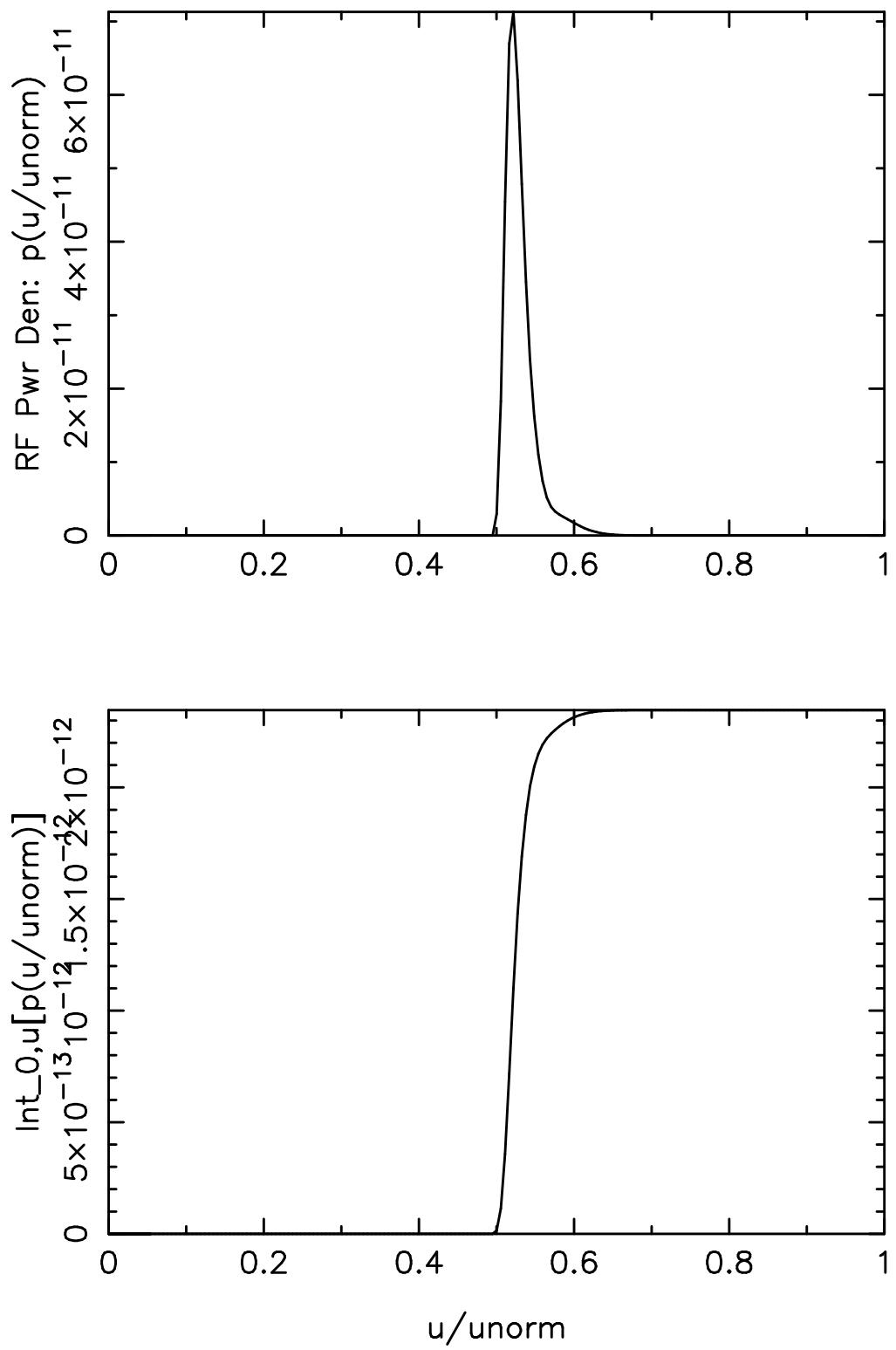


Electric field = 0.0000E+00 (V/cm)  
 FSA current den of species 2 = -9.6799E+00 Amps/cm\*\*2

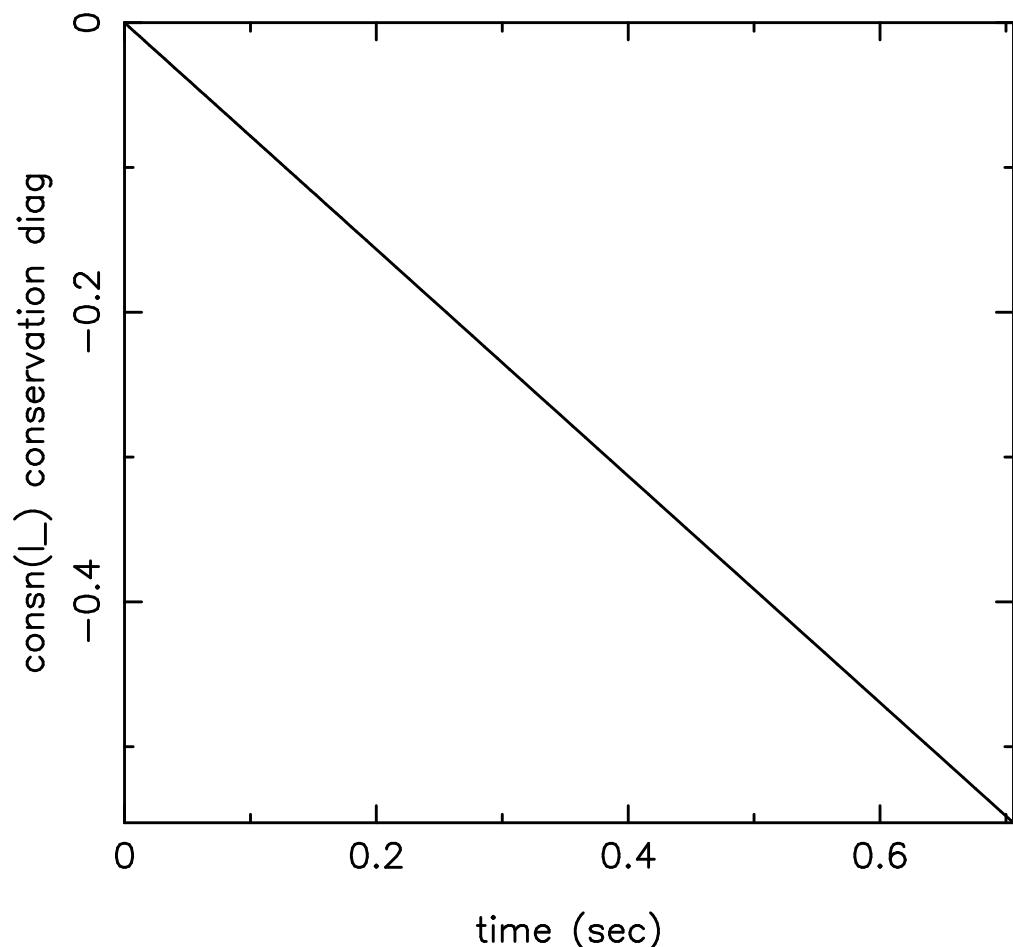
Current drive efficiency  $j/(2\pi R \cdot \text{prf}) = -3.7111\text{E}+09$  A/W  
 Electron current (units  $ne \cdot q \cdot v_{th}(\text{kelec}, \text{lr}_\perp)$ ) =  $-3.7180\text{E}-04$   
 power (units:  $ne \cdot v_{th}(\text{kelec}, \text{lr}_\perp)^2 \cdot 2 \cdot me \cdot \nu_0$ ) =  $7.4820\text{E}-16$   
 efficiency ( $j/p$ ) (Fisch 1978 units) =  $-4.9692\text{E}+11$   
 efficiency ( $j/p$ ) ( $e/(m \cdot c \cdot \nu_c)$  units) =  $-4.2153\text{E}+09$   
 $v_{th}(\text{kelec}, \text{lr}_\perp) = \sqrt{T/m} = 2.7612\text{E}+09$  cm/sec  
 $\nu_0 = 7.6666\text{E}+04$  Hz



Species: 2 Current =-.9680E+01 Amps/cm<sup>2</sup>



Species: 2 Power = $0.2346\text{E}-11$  Watts/cc

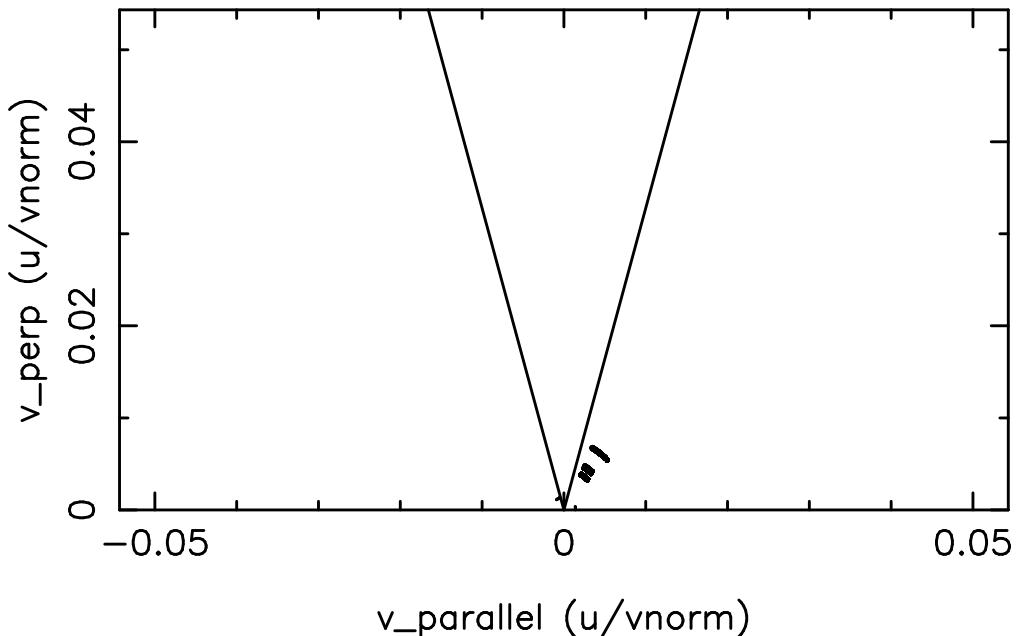


consn(l\_)= -5.5261E-01

Perfect conservation should yield machine accuracy,  
or about 1.e-14:

time step (n) is 100      time= 7.0600E-01 secs  
r/a= 1.1889E-01      radial position (R) = 1.8531E+02 cm

Species 1 Source Function (units: dist. f/sec)



time step n= 100      time= 7.06E-01 secs  
 $r/a = 1.189E-01$       radial position (R)= 1.8531E+02 cm  
 $rya = 1.189E-01$       R=rpcon= 1.8531E+02 cm, Surf# 7

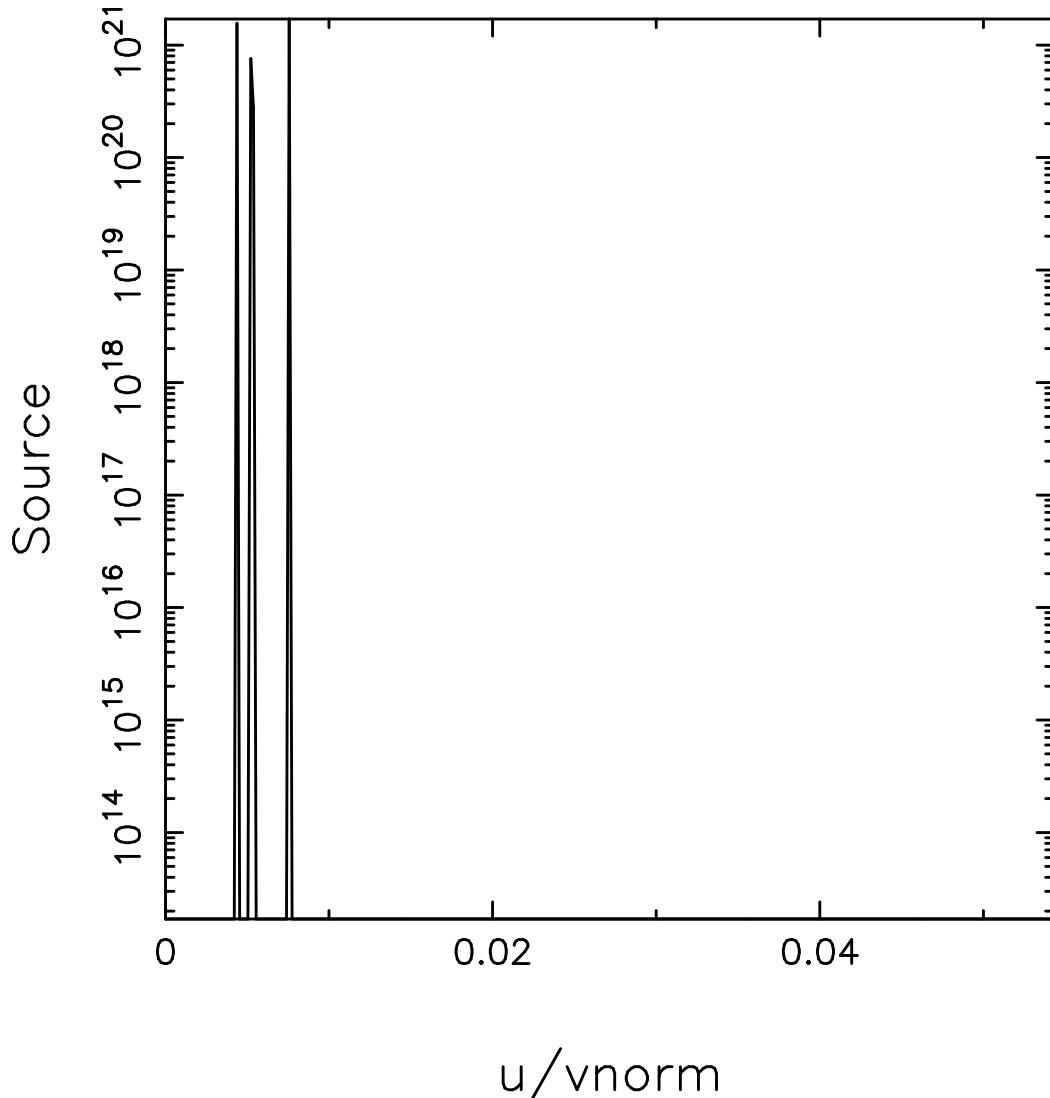
Particle source rate= 9.2171E+13 ptcls/cc/sec

Total source power [entr(..5..)]= 9.3592E-01 W/cc

Contour values:

1.6251E+10	6.4697E+10	2.5756E+11	1.0254E+12
4.0821E+12	1.6251E+13	6.4697E+13	2.5756E+14
1.0254E+15	4.0821E+15	1.6251E+16	6.4697E+16
2.5756E+17	1.0254E+18	4.0821E+18	1.6251E+19
6.4697E+19	2.5756E+20	1.0254E+21	4.0821E+21

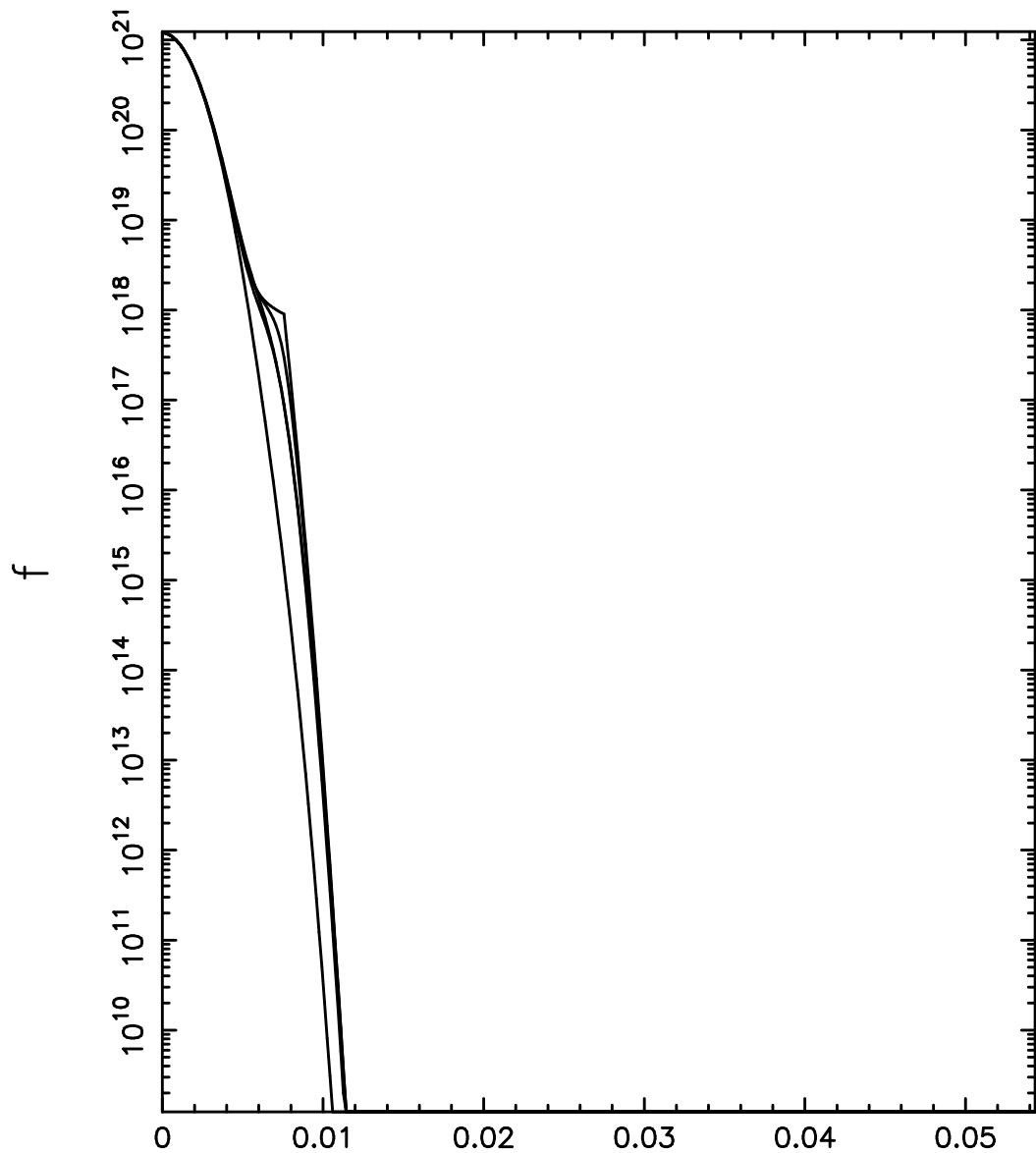
## Pitch Angle Avg Source vs. u



Particle source integrated over theta0 for species 1  
(normed so int(0,1)\*2pi\*x\*\*2\*dx=mid-plane source)  
vnorm= 3.6947E+10 cm/s

time step (n) is 100 time= 7.0600E-01 secs  
r/a= 1.1889E-01 radial position (R) = 1.8531E+02 cm

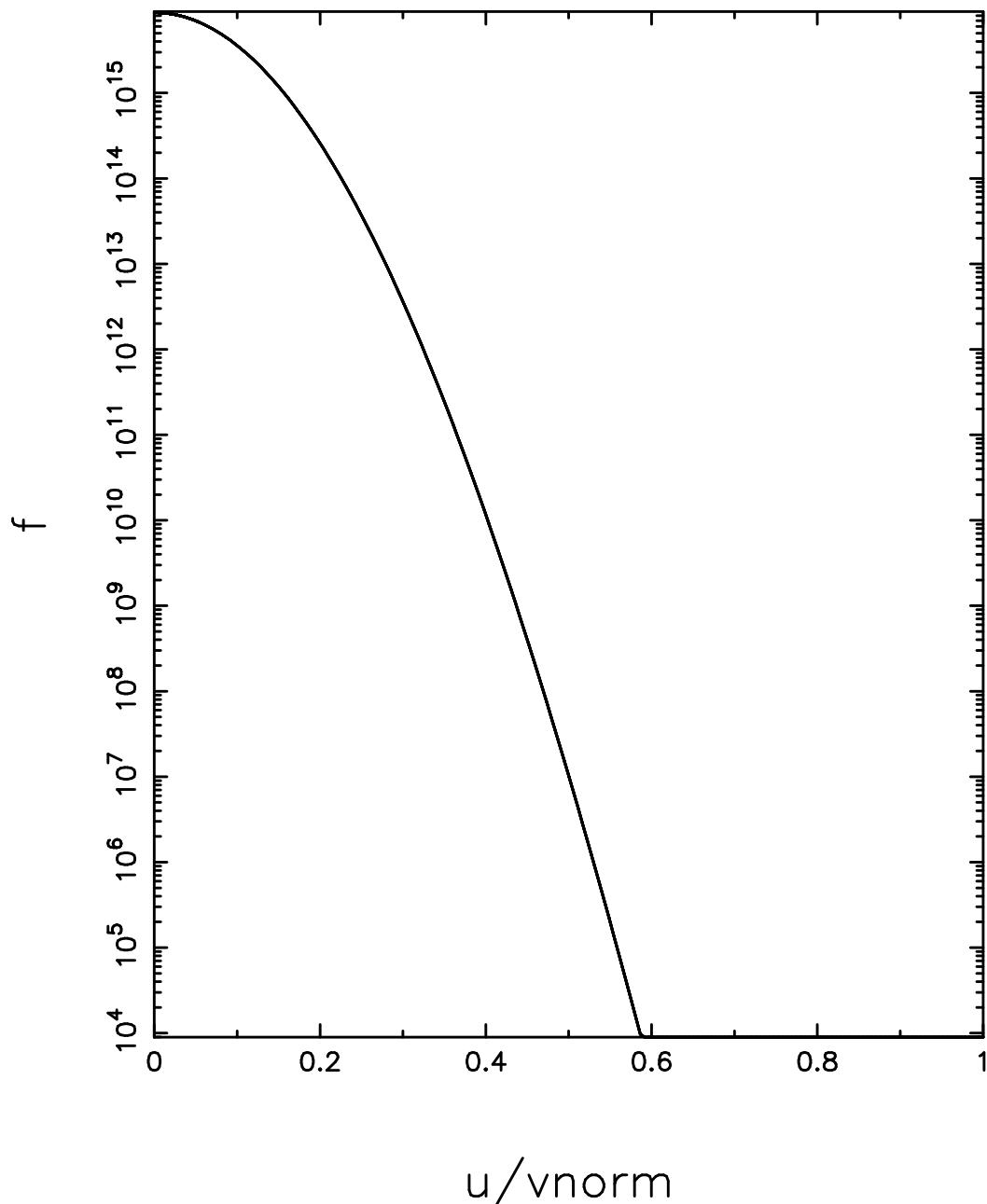
## Cuts of f vs. v, at cnst pitch angle



$u/v_{\text{norm}}$

Distribution function vs. velocity for some angles  
Species number=1, enorm= 3.00D+02  
time step (n)= 100 time= 0.706000E+00 secs  
r/a= 1.19E-01 radial position(R)= 1.853E+02 cm

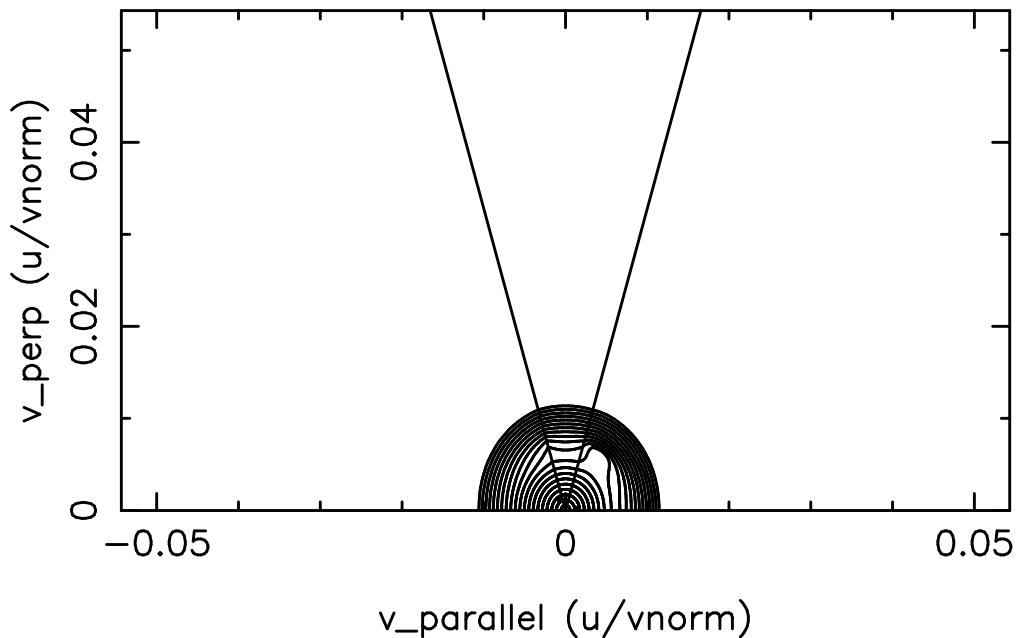
## Cuts of f vs. v, at cnst pitch angle



$u/v_{\text{norm}}$

Distribution function vs. velocity for some angles  
Species number=2, enorm= 3.00D+02  
time step (n)= 100 time= 0.706000E+00 secs  
r/a= 1.19E-01 radial position(R)= 1.853E+02 cm

### Species 1 Distribution Function Contour Plot

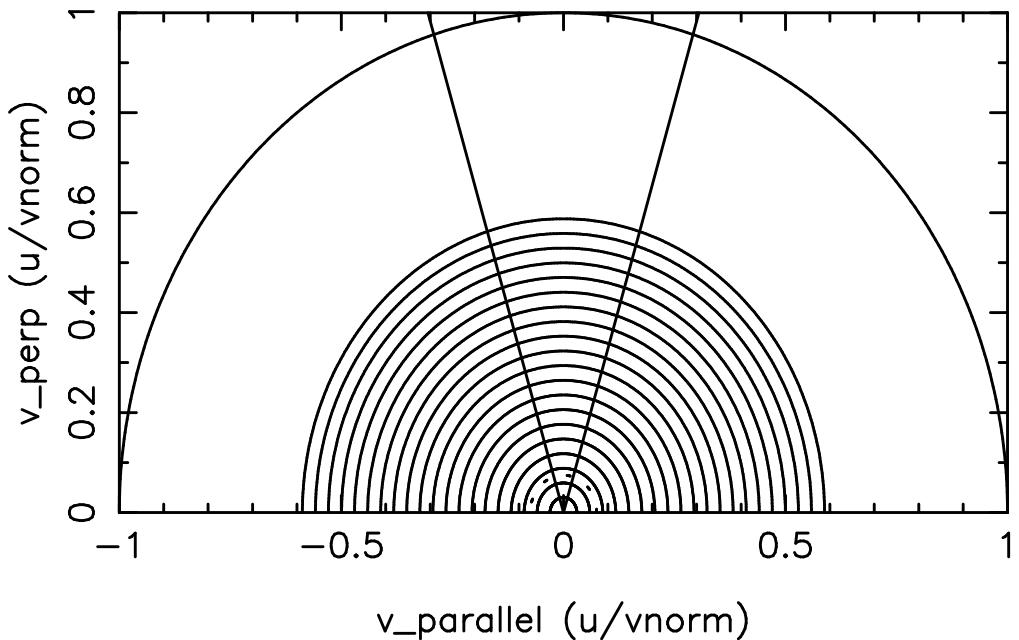


time step n= 100      time= 7.06E-01 secs  
 $r/a = 1.189E-01$       radial position (R)= 1.8531E+02 cm  
 $rya = 1.189E-01$       R=rpcon= 1.8531E+02 cm, Surf# 7

Contour values:

1.109267E+21	8.733874E+20	5.871876E+20	3.377982E+20
1.667594E+20	7.089539E+19	2.606429E+19	8.325350E+18
2.322183E+18	5.686886E+17	1.229648E+17	2.361122E+16
4.049621E+15	6.240076E+14	8.688287E+13	1.099216E+13
1.270577E+12	1.348868E+11	1.321832E+10	1.201458E+09

### Species 2 Distribution Function Contour Plot



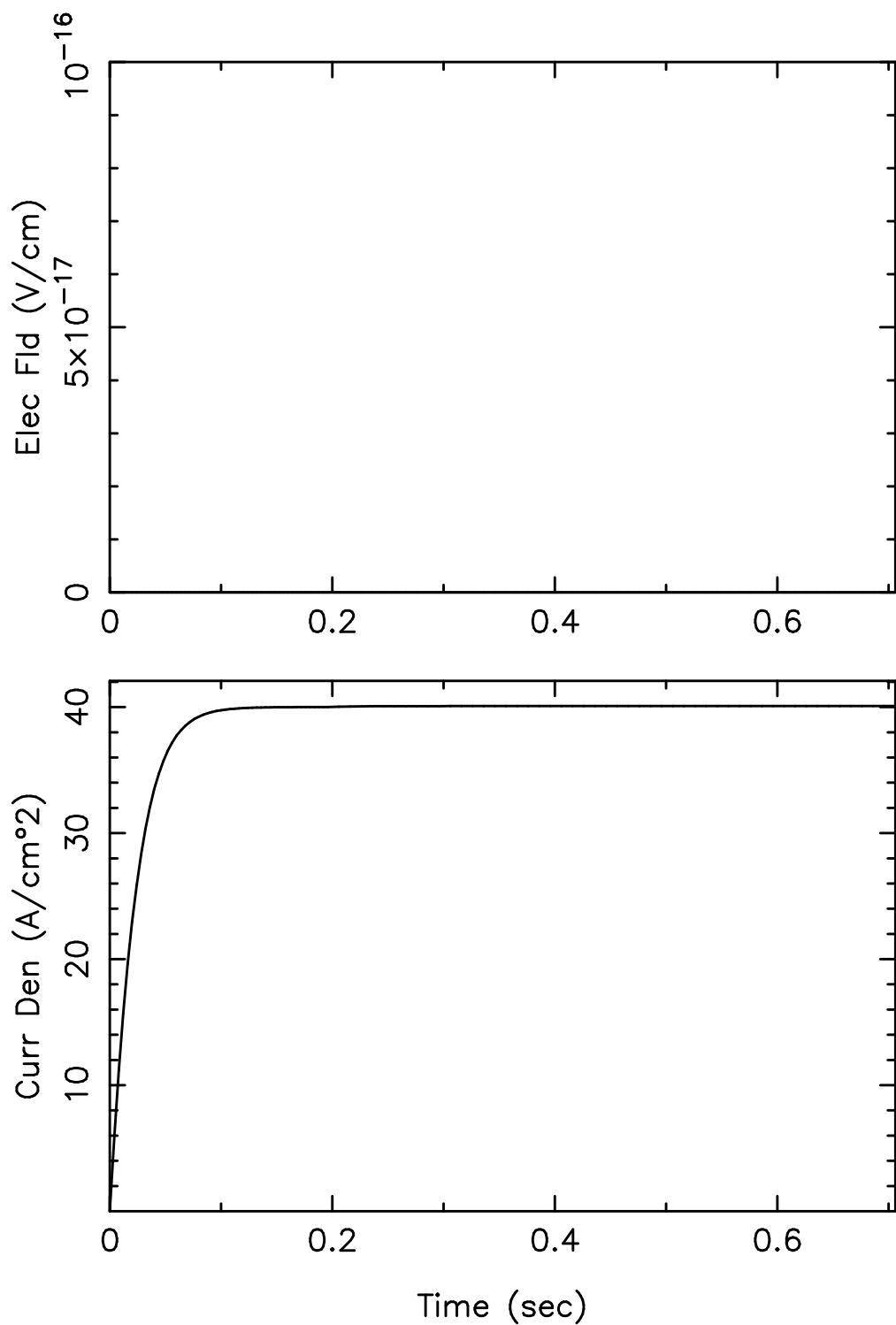
time step n= 100      time= 7.06E-01 secs  
 $r/a = 1.189E-01$       radial position (R)= 1.8531E+02 cm  
 $rya = 1.189E-01$       R=rpcon= 1.8531E+02 cm, Surf# 7

Contour values:

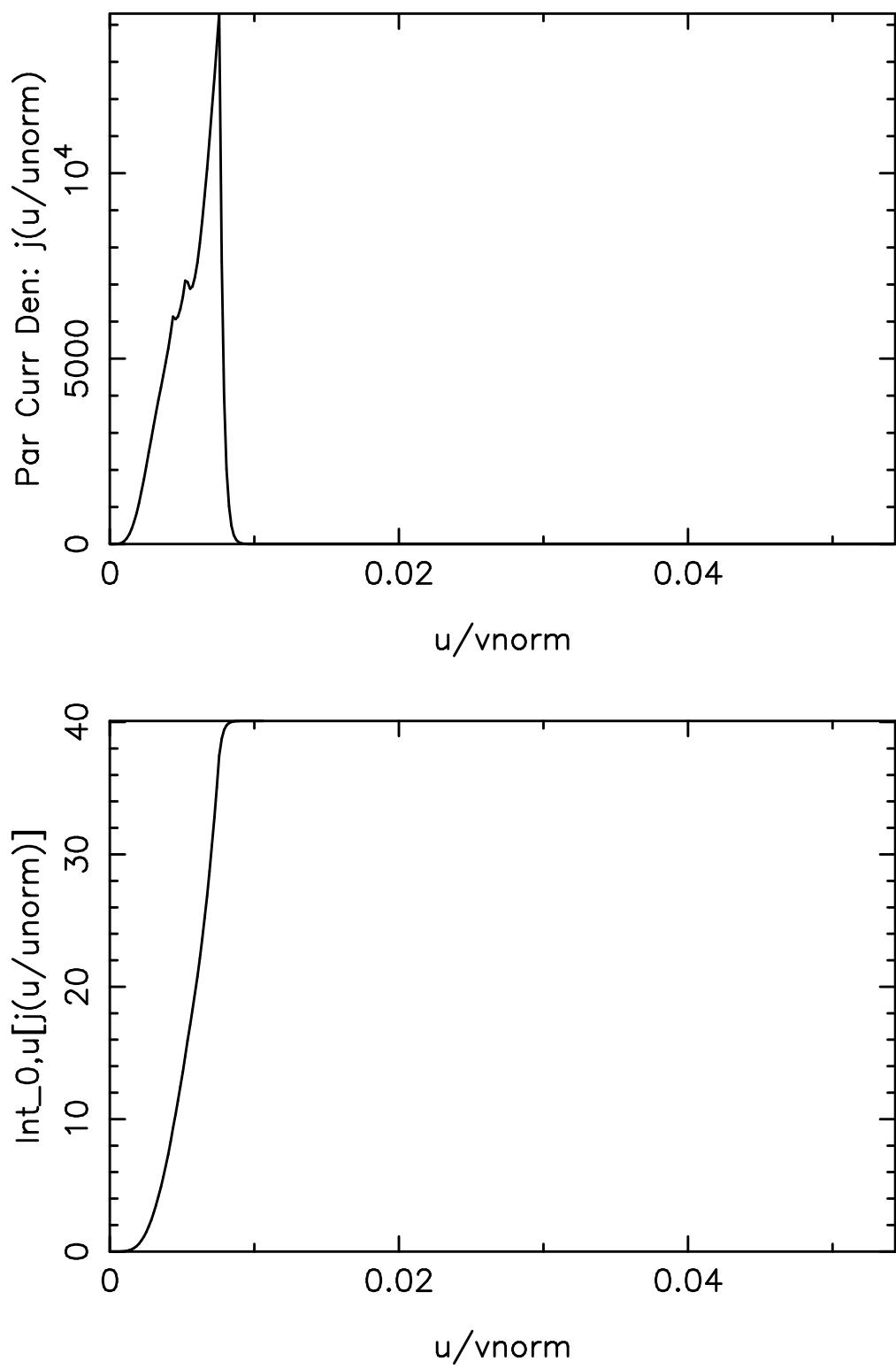
8.047190E+15	6.386468E+15	4.349003E+15	2.544923E+15
1.282328E+15	5.577893E+14	2.100871E+14	6.875107E+13
1.962278E+13	4.904840E+12	1.078353E+12	2.094787E+11
3.612348E+10	5.556153E+09	7.659023E+08	9.507442E+07
1.067833E+07	1.090230E+06	1.016460E+05	8.692590E+03

## LOCAL RADIAL QUANTITIES

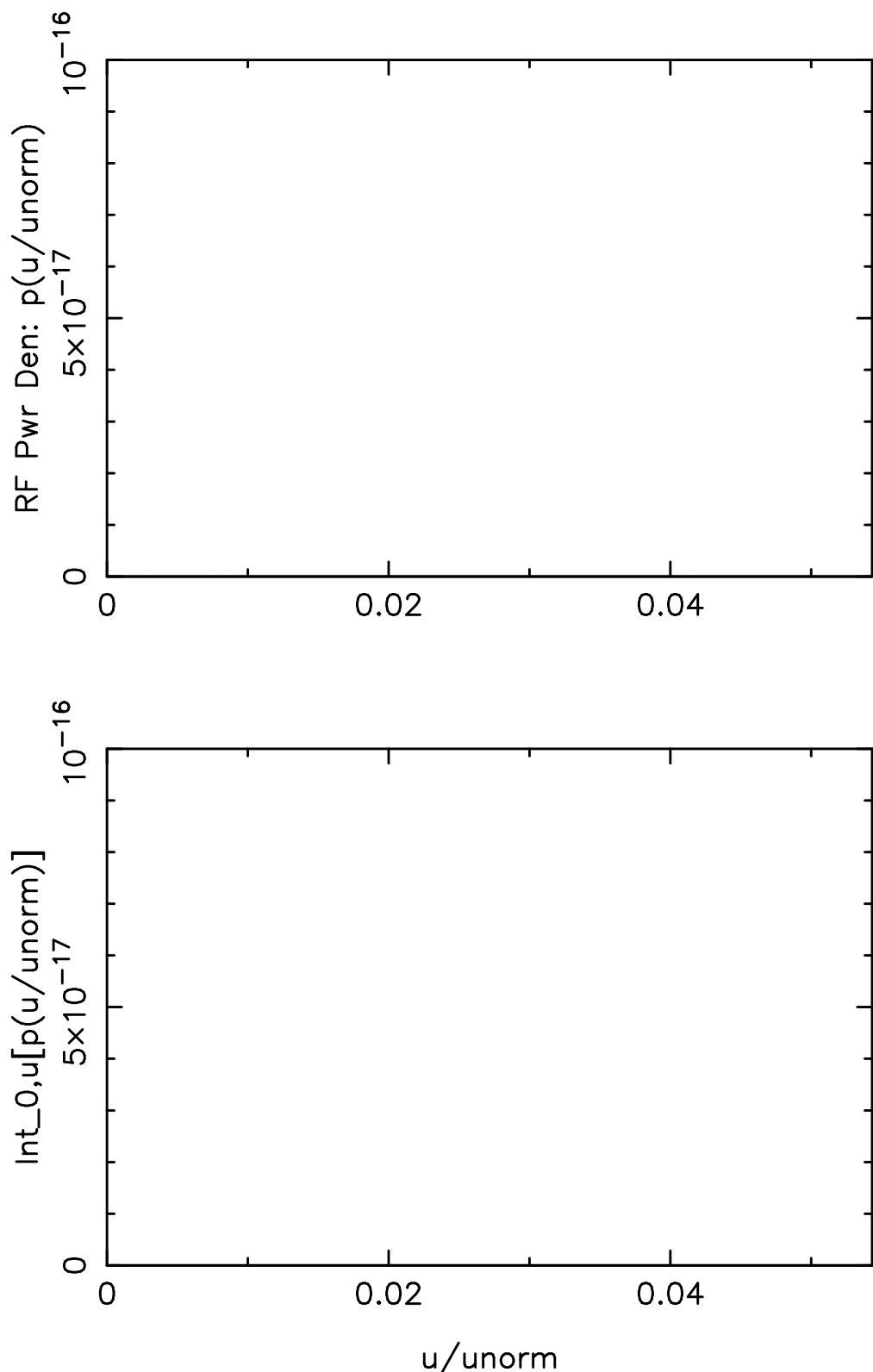
time step n= 100, time= 7.0600E-01 secs  
flux surf= 8 total flux surfs= 55  
r/a= 1.370E-01 radial position (R)= 1.8640E+02 cms  
rya= 1.370E-01 R=rpcon= 1.864E+02 cm  
enormi, enorme(=enorm) (kev) = 3250.000 300.000  
vnorm/c = 1.2324136  
vthe (sqrt(te/me))/c = 0.0917379  
vthe/vnorm = 0.0744376  
k= 1 vth(k)/vnorm = 0.0014187  
k= 2 vth(k)/vnorm = 0.0744376  
k= 3 vth(k)/vnorm = 0.0014187  
k= 4 vth(k)/vnorm = 0.0001417  
k= 5 vth(k)/vnorm = 0.0744376



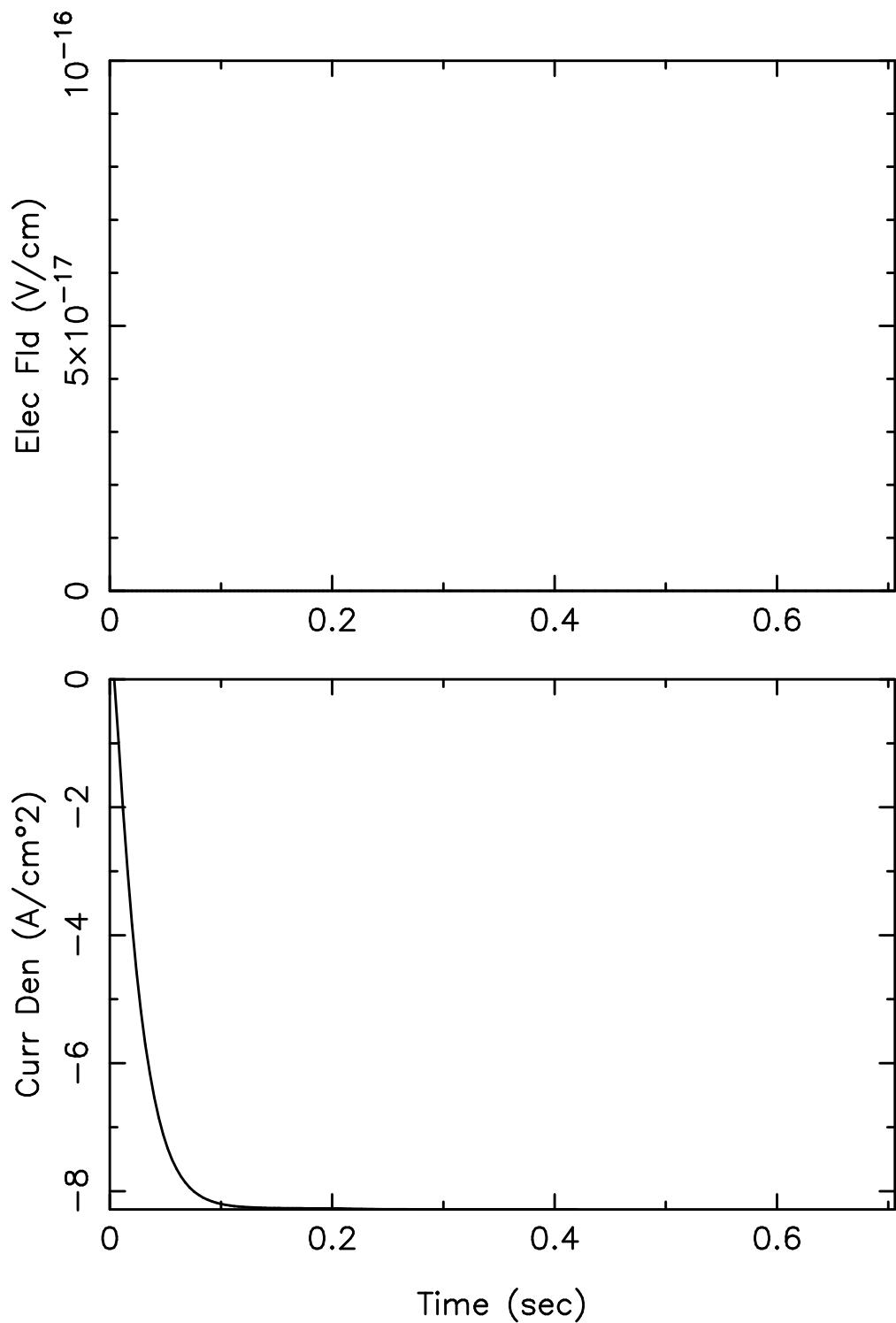
Electric field = 0.0000E+00 (V/cm)  
FSA current den of species 1 = 4.0078E+01 Amps/cm\*\*2



Species: 1 Current = 0.4008E+02 Amps/cm<sup>2</sup>

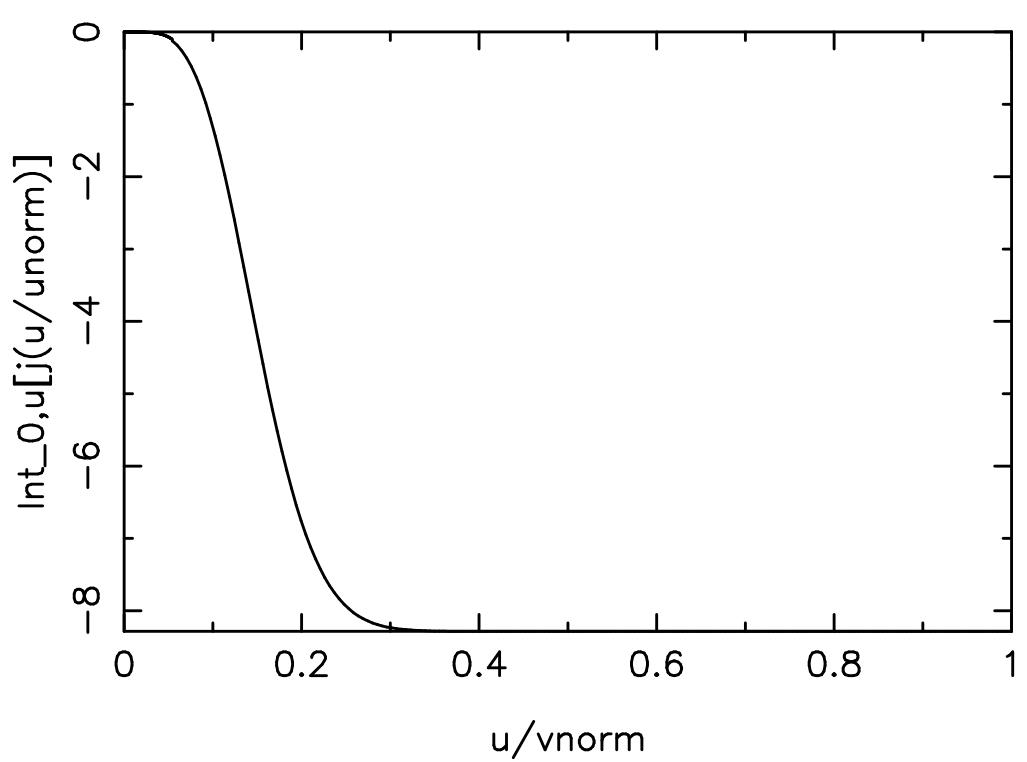
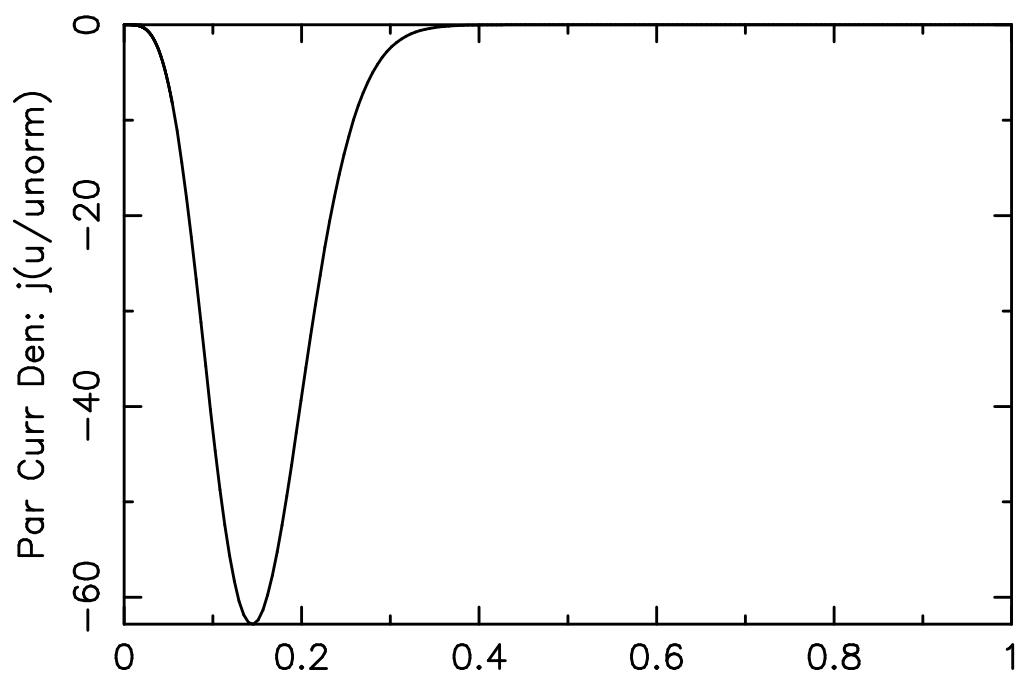


Species: 1 Power =-.9893E-37 Watts/cc

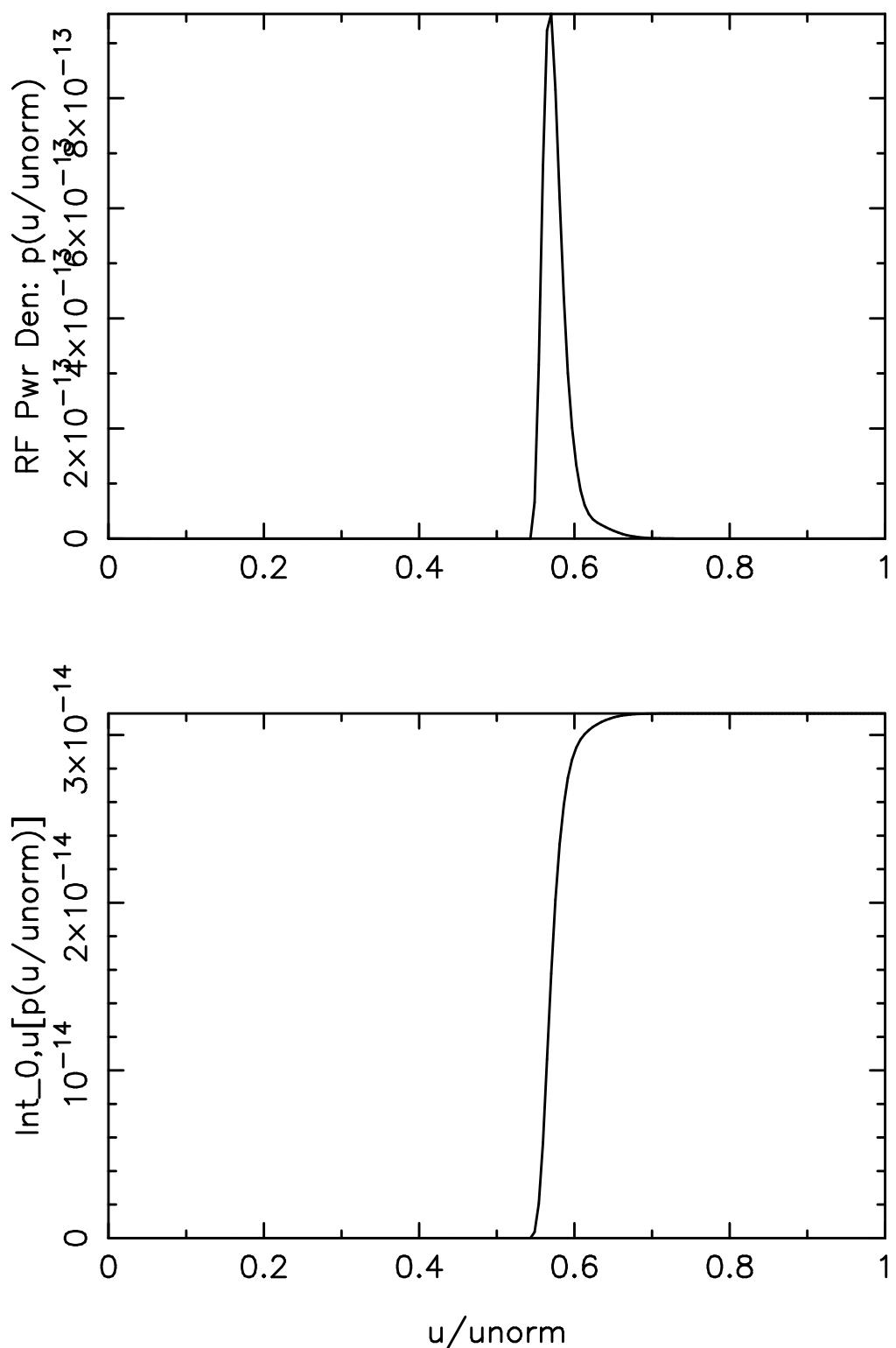


Electric field = 0.0000E+00 (V/cm)  
 FSA current den of species 2 = -8.2845E+00 Amps/cm\*\*2

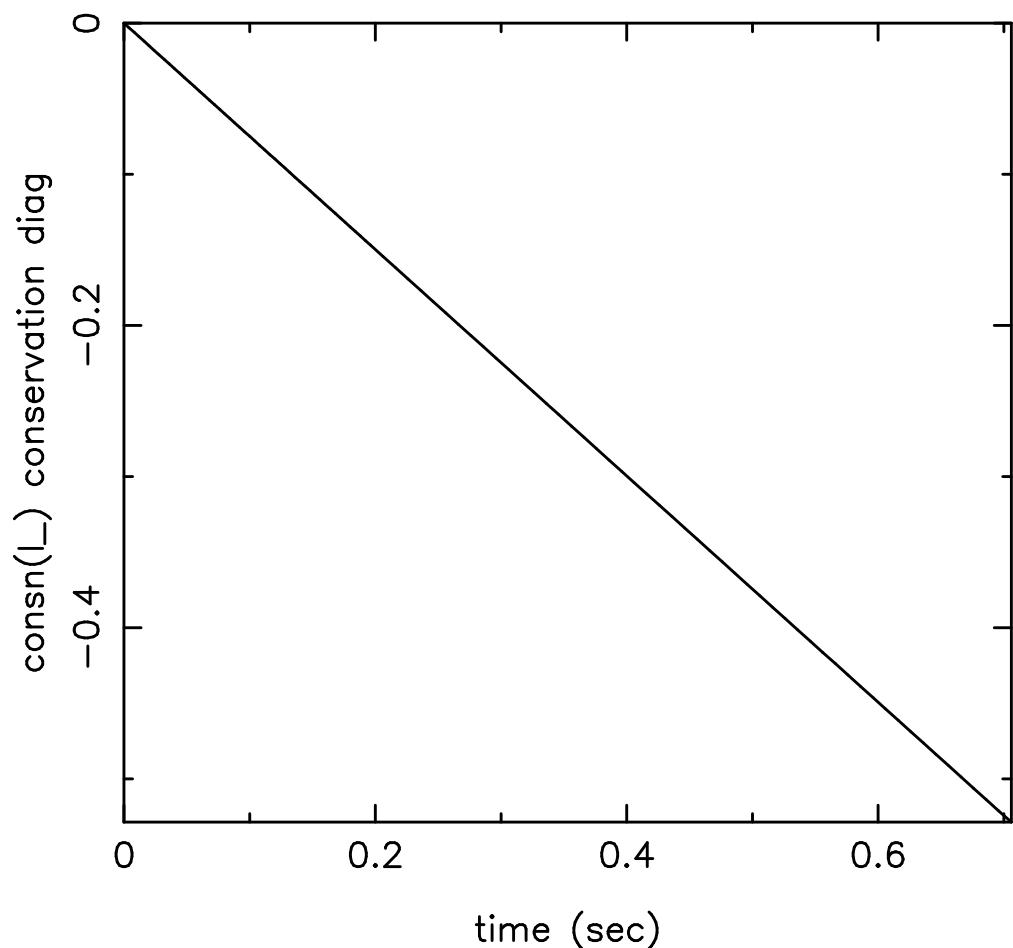
Current drive efficiency  $j/(2\pi R \cdot prf)$  = -2.3858E+11 A/W  
 Electron current (units  $ne \cdot q \cdot v_{th}(kelec, lr_*)$ ) = -3.2136E-04  
 power (units:  $ne \cdot v_{th}(kelec, lr_*)^{**2} \cdot me \cdot nu0$ ) = 1.0054E-17  
 efficiency ( $j/p$ ) (Fisch 1978 units) = -3.1965E+13  
 efficiency ( $j/p$ ) ( $e/(m \cdot c \cdot nu_c)$  units) = -2.6901E+11  
 $v_{th}(kelec, lr_*) = \sqrt{T/m}$  = 2.7502E+09 cm/sec  
 $nu0 = 7.7128E+04$  Hz



Species: 2 Current =-.8285E+01 Amps/cm<sup>2</sup>



Species: 2 Power = $0.3128\text{E}-13$  Watts/cc

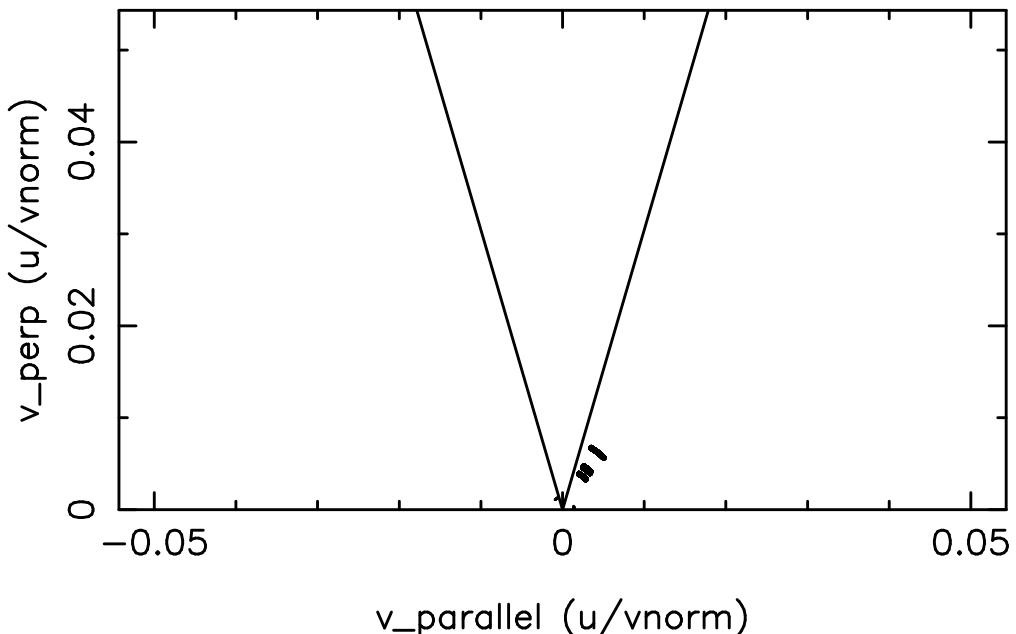


consn(l\_)= -5.2867E-01

Perfect conservation should yield machine accuracy,  
or about 1.e-14:

time step (n) is 100      time= 7.0600E-01 secs  
r/a= 1.3704E-01      radial position (R) = 1.8640E+02 cm

Species 1 Source Function (units: dist. f/sec)



time step n= 100      time= 7.06E-01 secs  
 $r/a = 1.370E-01$       radial position ( $R$ )= 1.8640E+02 cm  
 $rya = 1.370E-01$        $R=rpcon = 1.8640E+02$  cm, Surf# 8

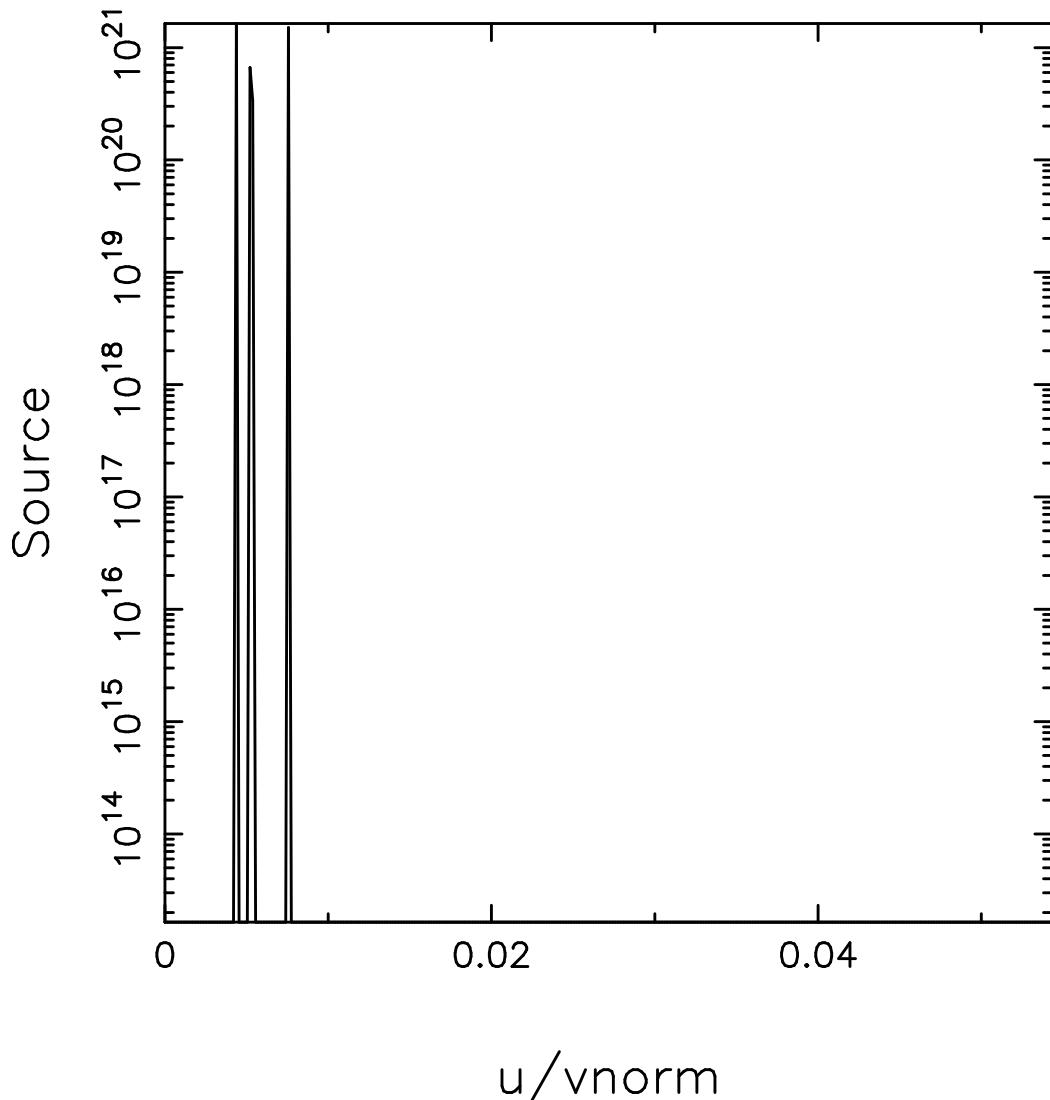
Particle source rate= 8.7655E+13 ptcls/cc/sec

Total source power [entr(..5..)]= 8.6782E-01 W/cc

Contour values:

1.4745E+10	5.8702E+10	2.3370E+11	9.3036E+11
3.7038E+12	1.4745E+13	5.8702E+13	2.3370E+14
9.3036E+14	3.7038E+15	1.4745E+16	5.8702E+16
2.3370E+17	9.3036E+17	3.7038E+18	1.4745E+19
5.8702E+19	2.3370E+20	9.3036E+20	3.7038E+21

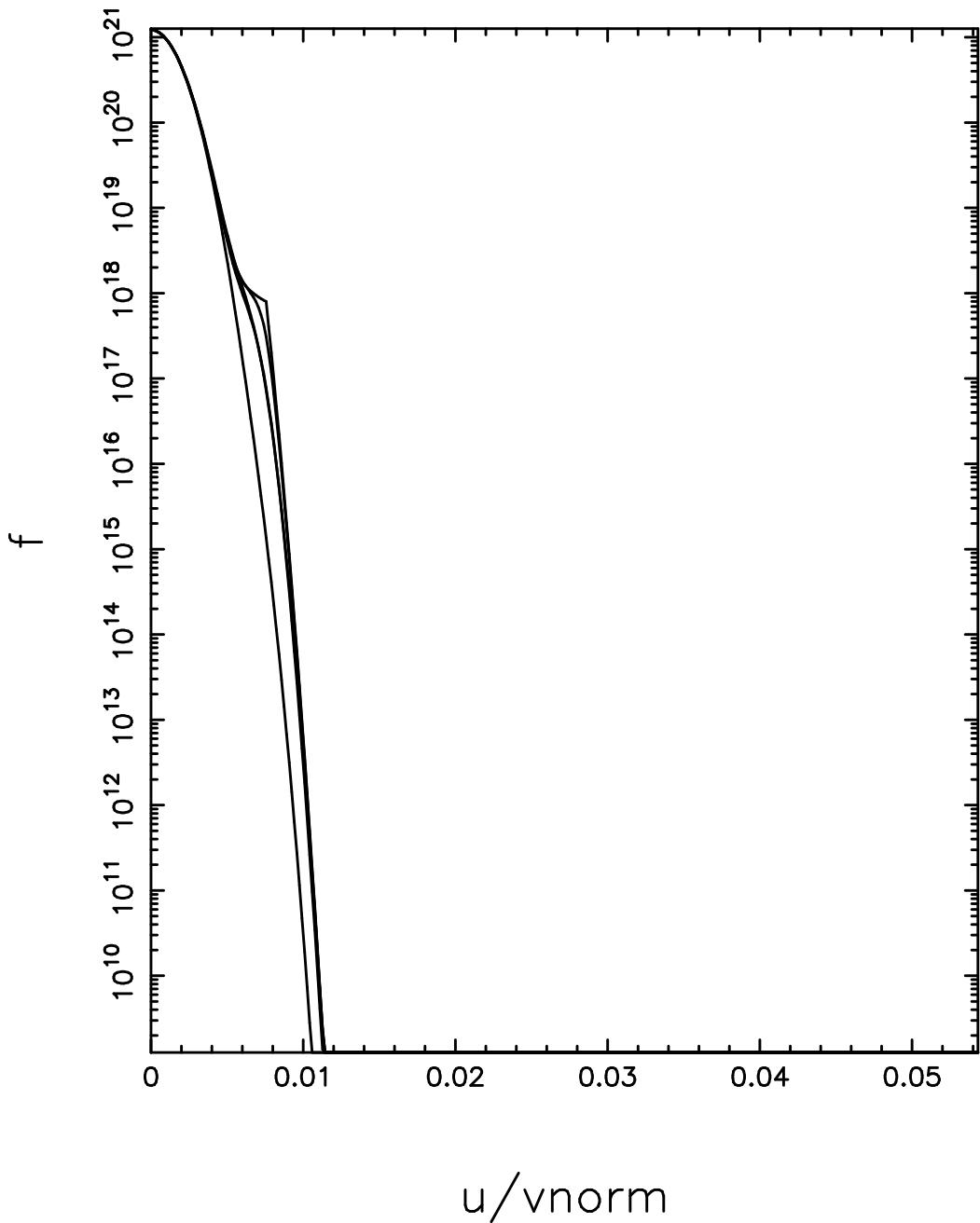
## Pitch Angle Avg Source vs. u



Particle source integrated over theta0 for species 1  
(normed so int(0,1)\*2pi\*x\*\*2\*dx=mid-plane source)  
vnorm= 3.6947E+10 cm/s

time step (n) is 100 time= 7.0600E-01 secs  
r/a= 1.3704E-01 radial position (R) = 1.8640E+02 cm

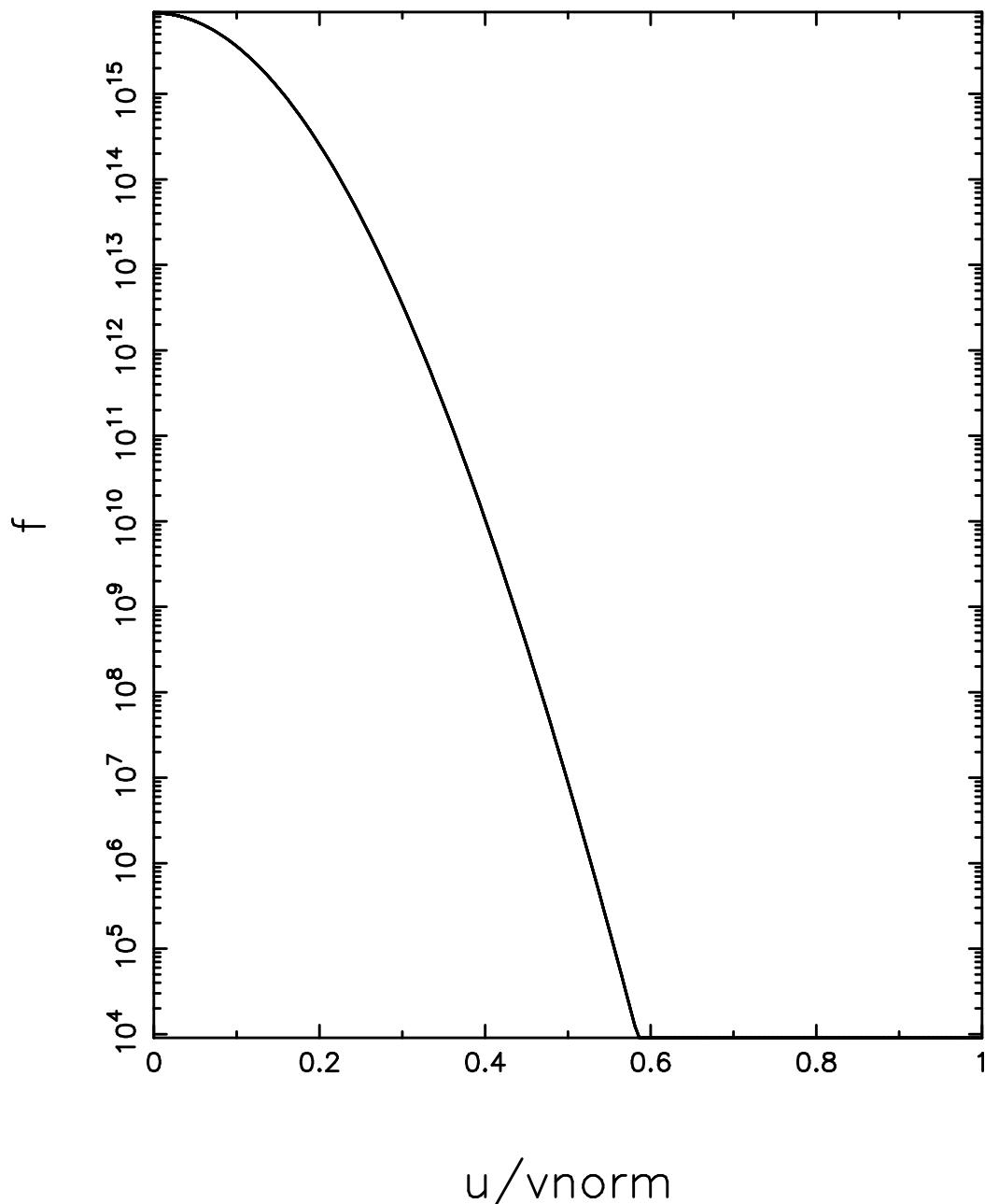
## Cuts of f vs. v, at cnst pitch angle



$u/v_{\text{norm}}$

Distribution function vs. velocity for some angles  
Species number=1, enorm= 3.00D+02  
time step (n)= 100 time= 0.706000E+00 secs  
r/a= 1.37E-01 radial position(R)= 1.864E+02 cm

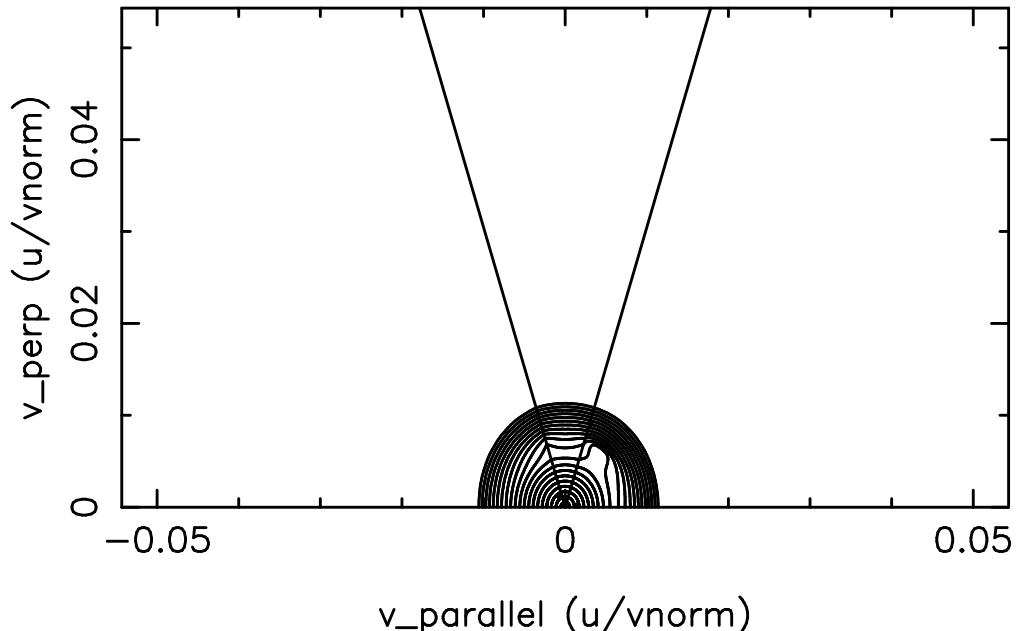
Cuts of f vs. v, at cnst pitch angle



$u/v_{\text{norm}}$

Distribution function vs. velocity for some angles  
Species number=2, enorm= 3.00D+02  
time step (n)= 100 time= 0.706000E+00 secs  
r/a= 1.37E-01 radial position(R)= 1.864E+02 cm

### Species 1 Distribution Function Contour Plot

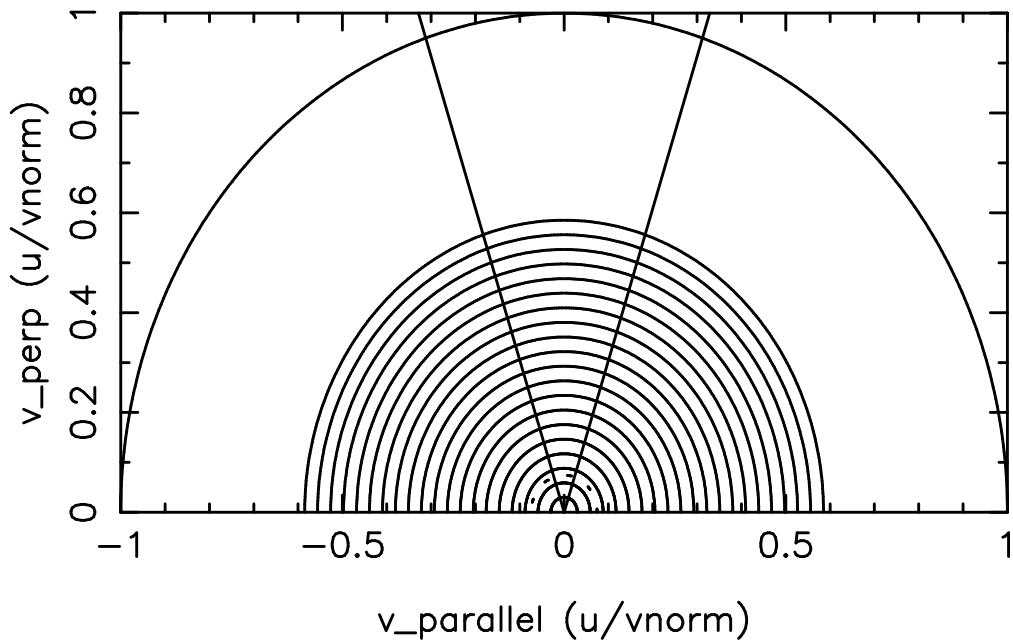


time step n= 100      time= 7.06E-01 secs  
 $r/a = 1.370E-01$       radial position (R)= 1.8640E+02 cm  
 $rya = 1.370E-01$       R=rpcon= 1.8640E+02 cm, Surf# 8

Contour values:

1.132420E+21	8.918400E+20	5.998356E+20	3.452594E+20
1.705521E+20	7.255963E+19	2.669615E+19	8.533542E+18
2.381925E+18	5.836797E+17	1.262687E+17	2.425374E+16
4.160411E+15	6.410273E+14	8.922316E+13	1.128147E+13
1.302860E+12	1.381495E+11	1.351770E+10	1.226430E+09

### Species 2 Distribution Function Contour Plot



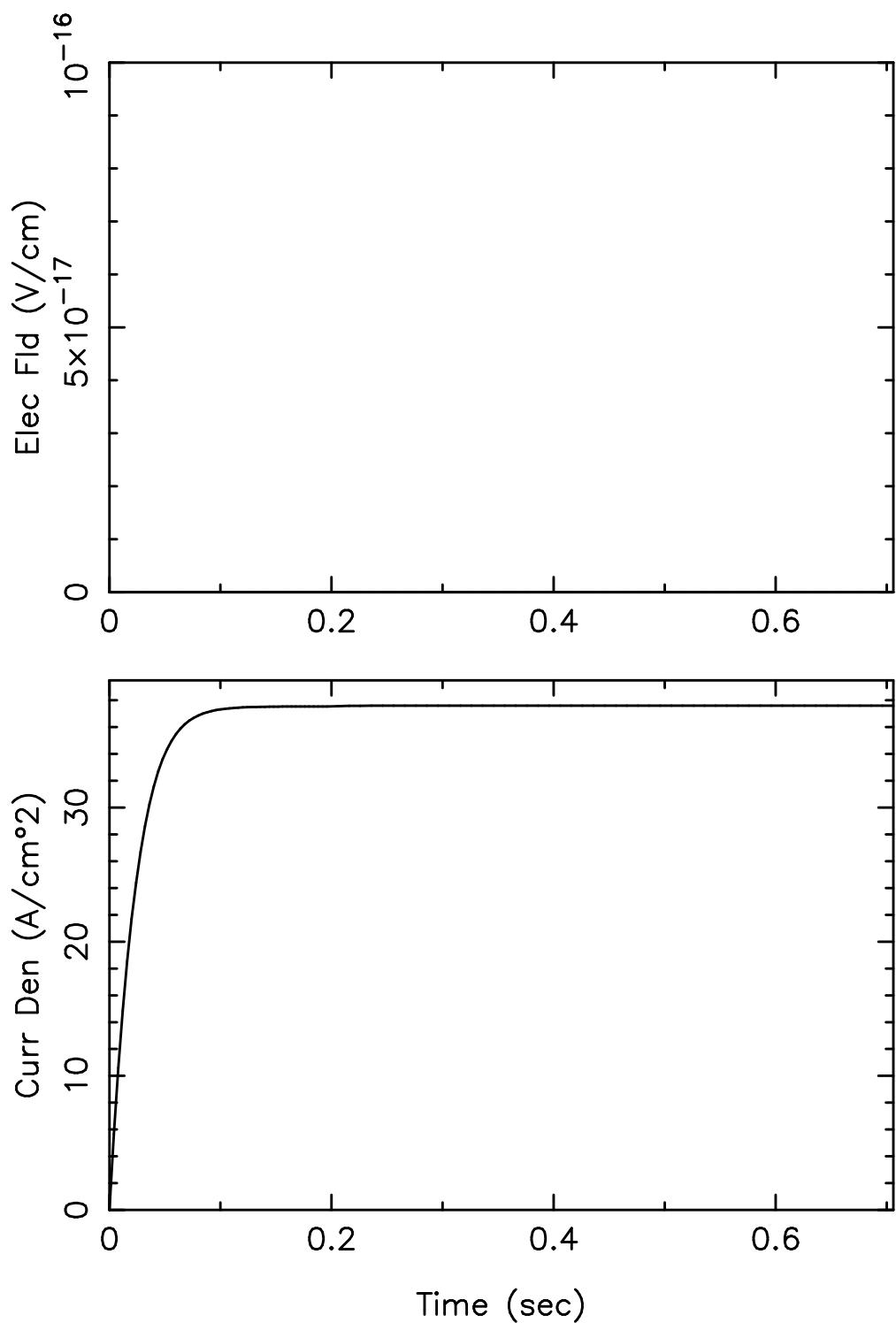
time step n= 100      time= 7.06E-01 secs  
 $r/a = 1.370E-01$       radial position (R)= 1.8640E+02 cm  
 $rya = 1.370E-01$       R=rpcon= 1.8640E+02 cm, Surf# 8

Contour values:

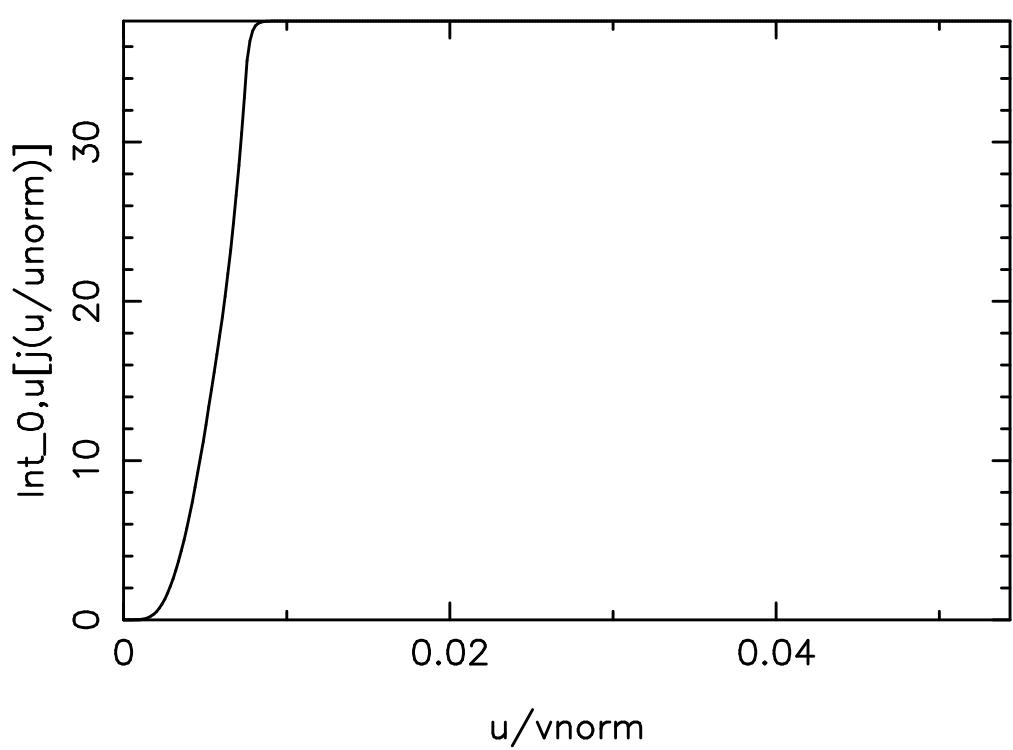
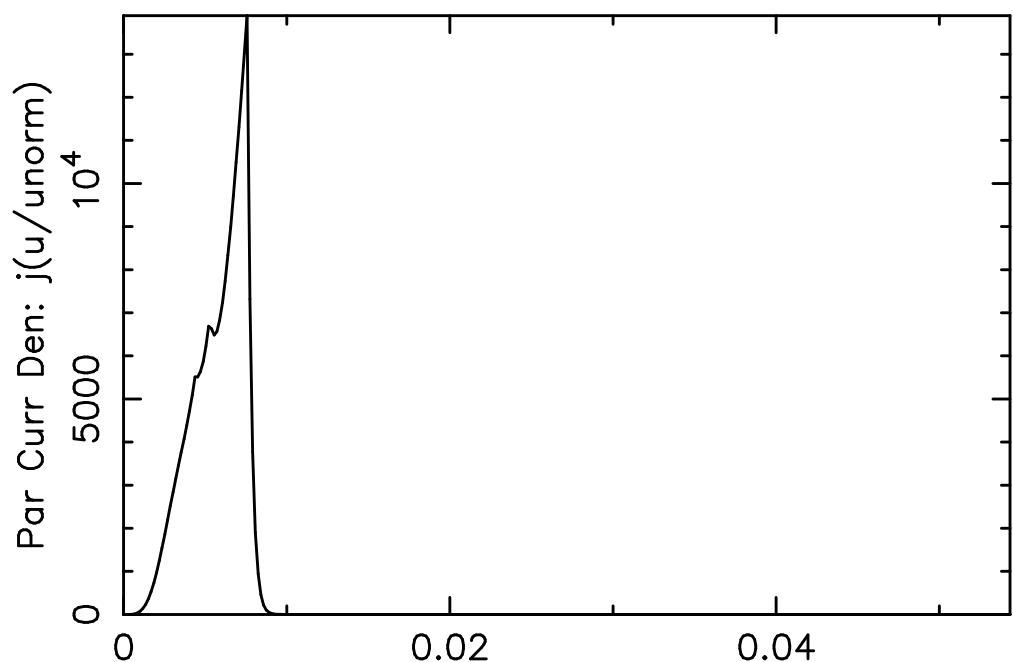
8.151668E+15	6.470604E+15	4.407640E+15	2.580285E+15
1.300784E+15	5.661294E+14	2.133532E+14	6.986120E+13
1.995092E+13	4.989402E+12	1.097407E+12	2.132444E+11
3.677850E+10	5.656771E+09	7.795963E+08	9.673066E+07
1.085677E+07	1.107383E+06	1.031171E+05	8.804885E+03

## LOCAL RADIAL QUANTITIES

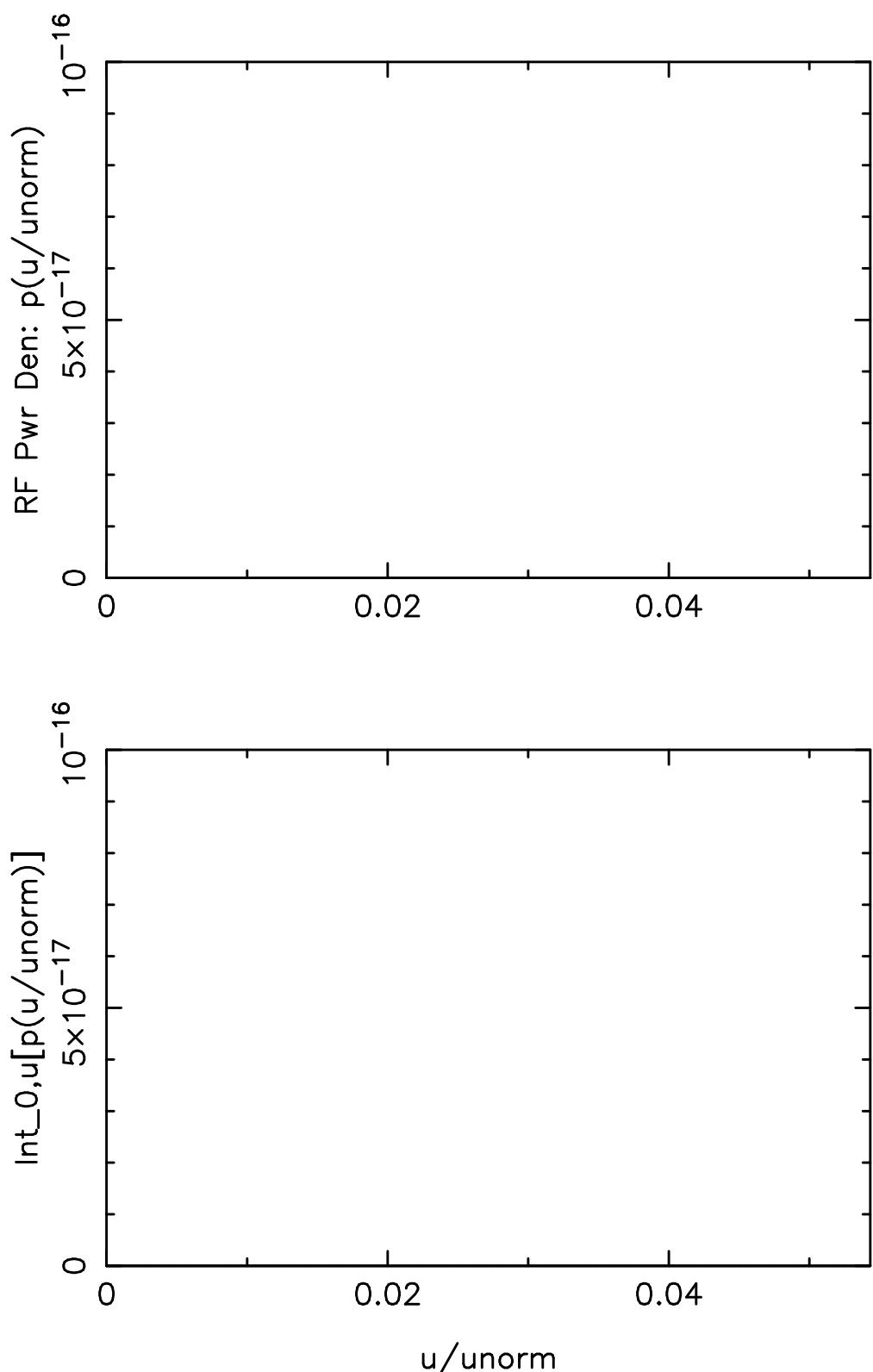
```
time step n= 100,      time= 7.0600E-01 secs
flux surf= 9      total flux surfs= 55
r/a= 1.552E-01      radial position (R)= 1.8747E+02 cms
rya= 1.552E-01      R=rpcon= 1.875E+02 cm
enormi, enorme(=enorm) (kev) = 3250.000      300.000
vnorm/c = 1.2324136
vthe (sqrt(te/me))/c = 0.0913228
vthe/vnorm = 0.0741008
k= 1 vth(k)/vnorm = 0.0014123
k= 2 vth(k)/vnorm = 0.0741008
k= 3 vth(k)/vnorm = 0.0014123
k= 4 vth(k)/vnorm = 0.0001411
k= 5 vth(k)/vnorm = 0.0741008
```



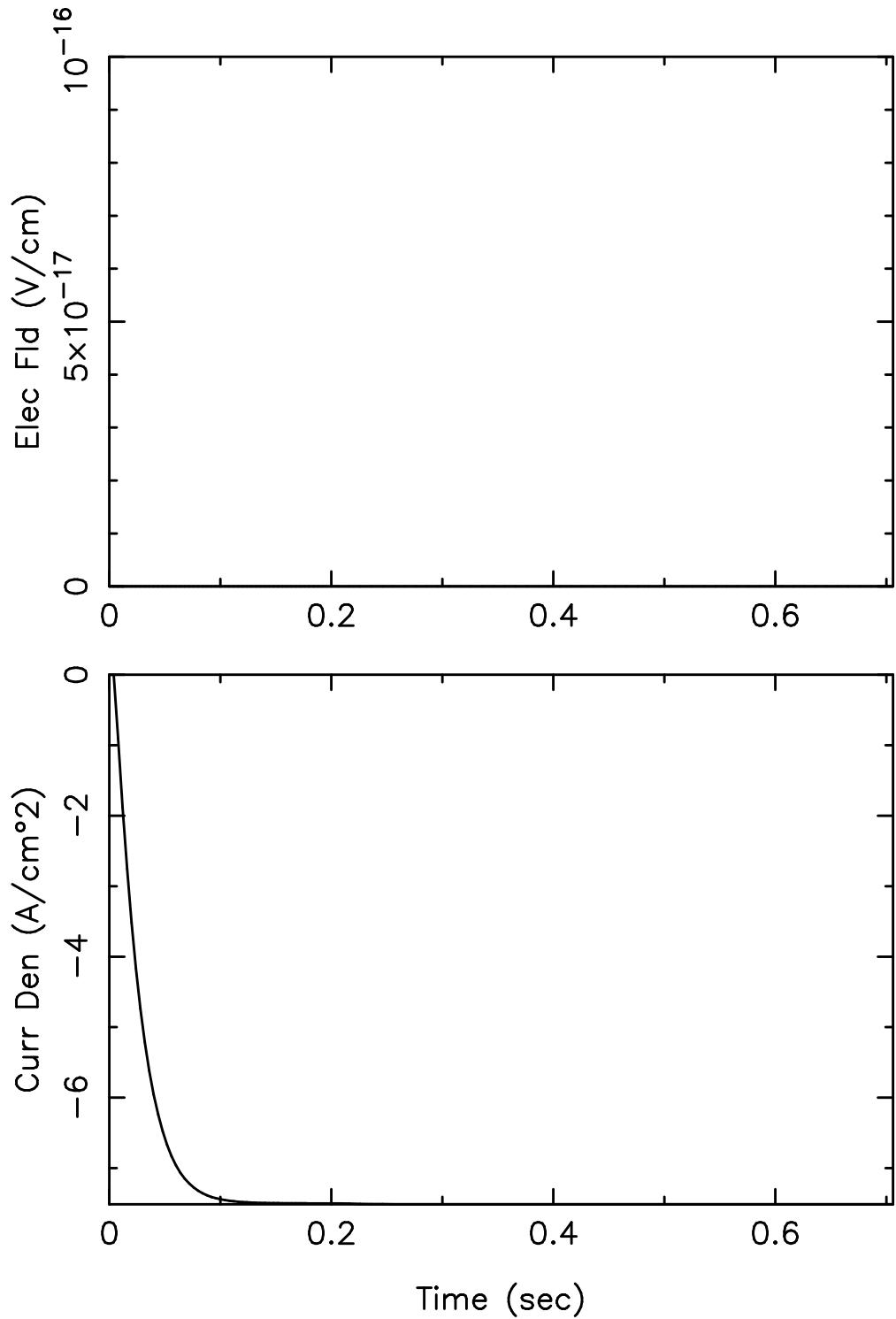
Electric field = 0.0000E+00 (V/cm)  
FSA current den of species 1 = 3.7603E+01 Amps/cm\*\*2



Species: 1 Current = $0.3760E+02$  Amps/cm $^2$



Species: 1 Power =-.1259E-64 Watts/cc



Electric field = 0.0000E+00 (V/cm)

FSA current den of species 2 = -7.5136E+00 Amps/cm\*\*2

Current drive efficiency  $j/(2\pi R \text{prf})$  = -2.3092E+13 A/W

Electron current (units  $ne*q*vth(kelec,lr_2)$ ) = -2.9474E-04

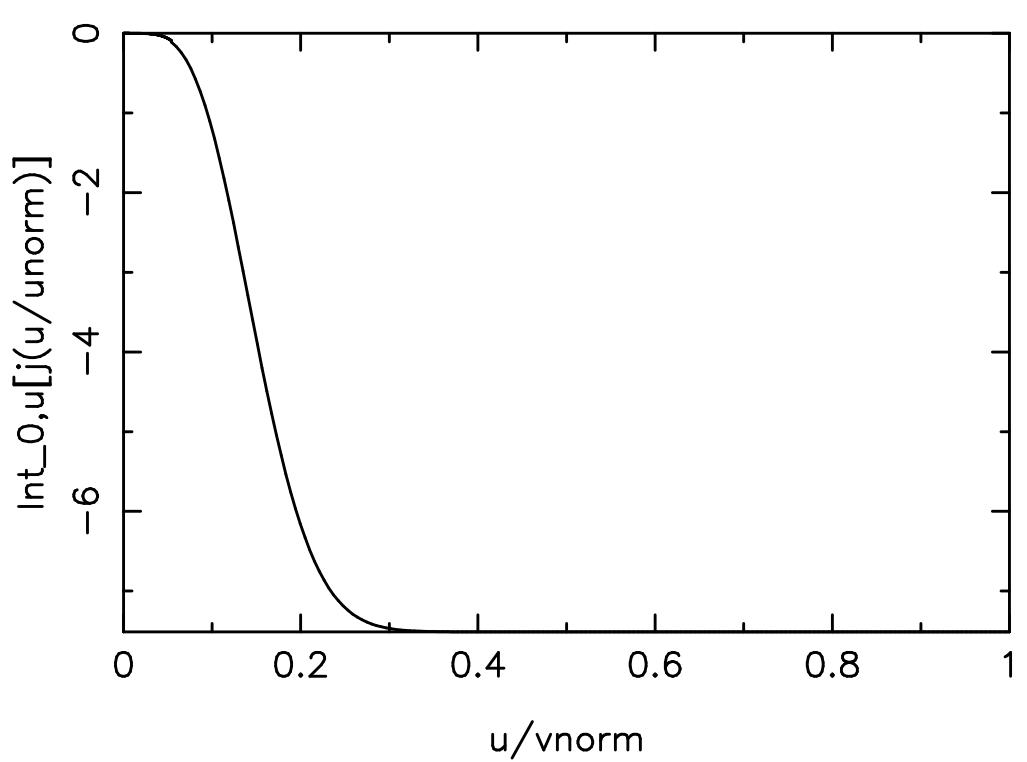
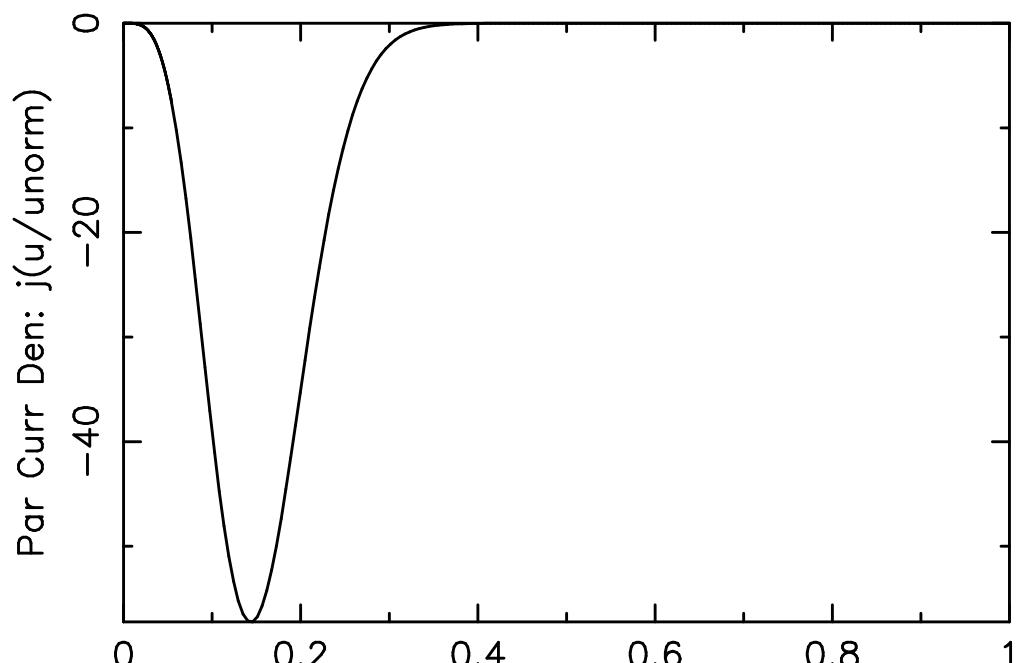
power (units:  $ne*vth(kelec,lr_2)**2*me*\nu_0$ ) = 9.5194E-20

efficiency ( $j/p$ ) (Fisch 1978 units) = -3.0963E+15

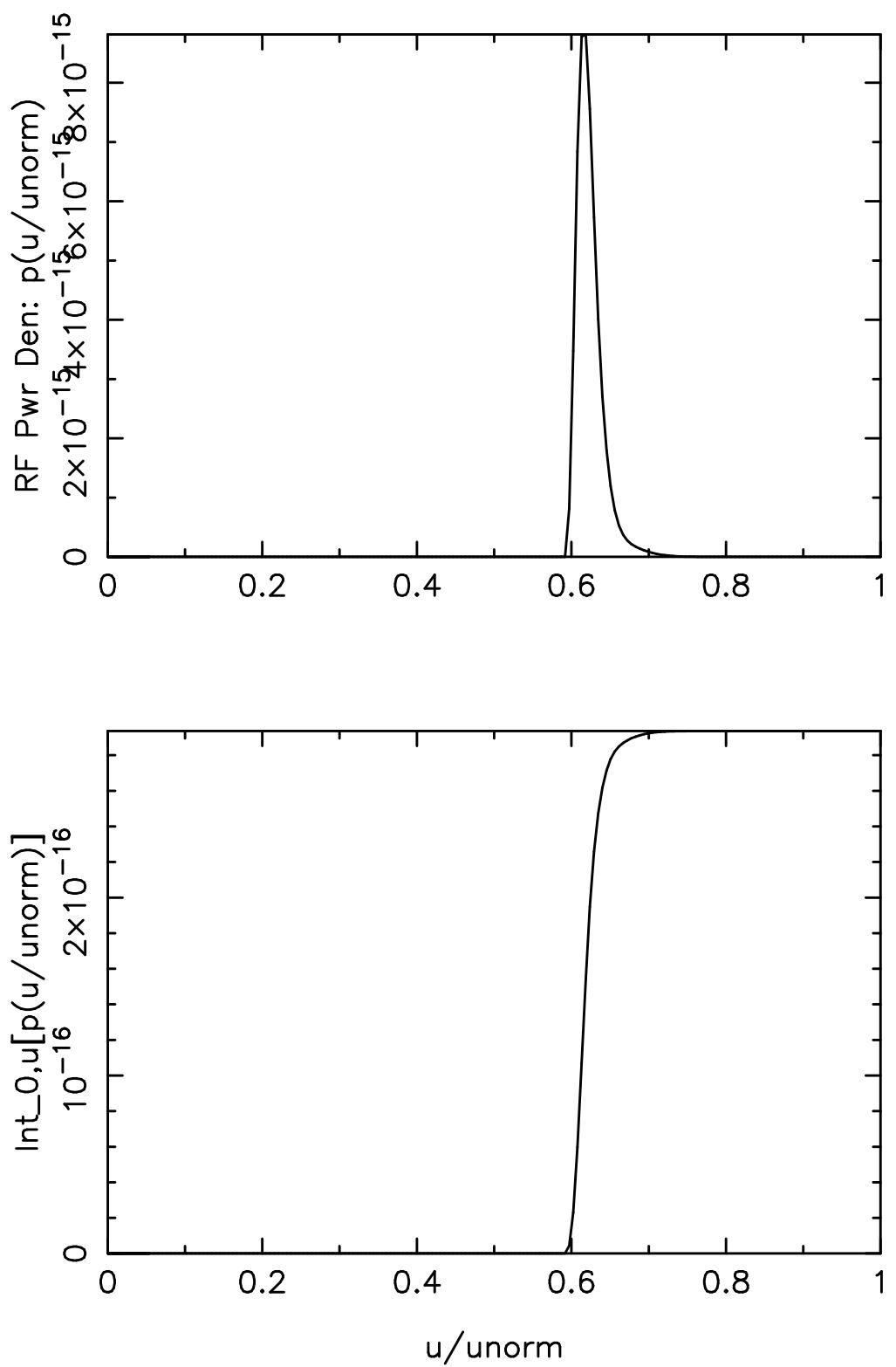
efficiency ( $j/p$ ) ( $e/(m*c*\nu_c)$  units) = -2.5822E+13

$vth(kelec,lr_2) = \sqrt{T/m} = 2.7378E+09$  cm/sec

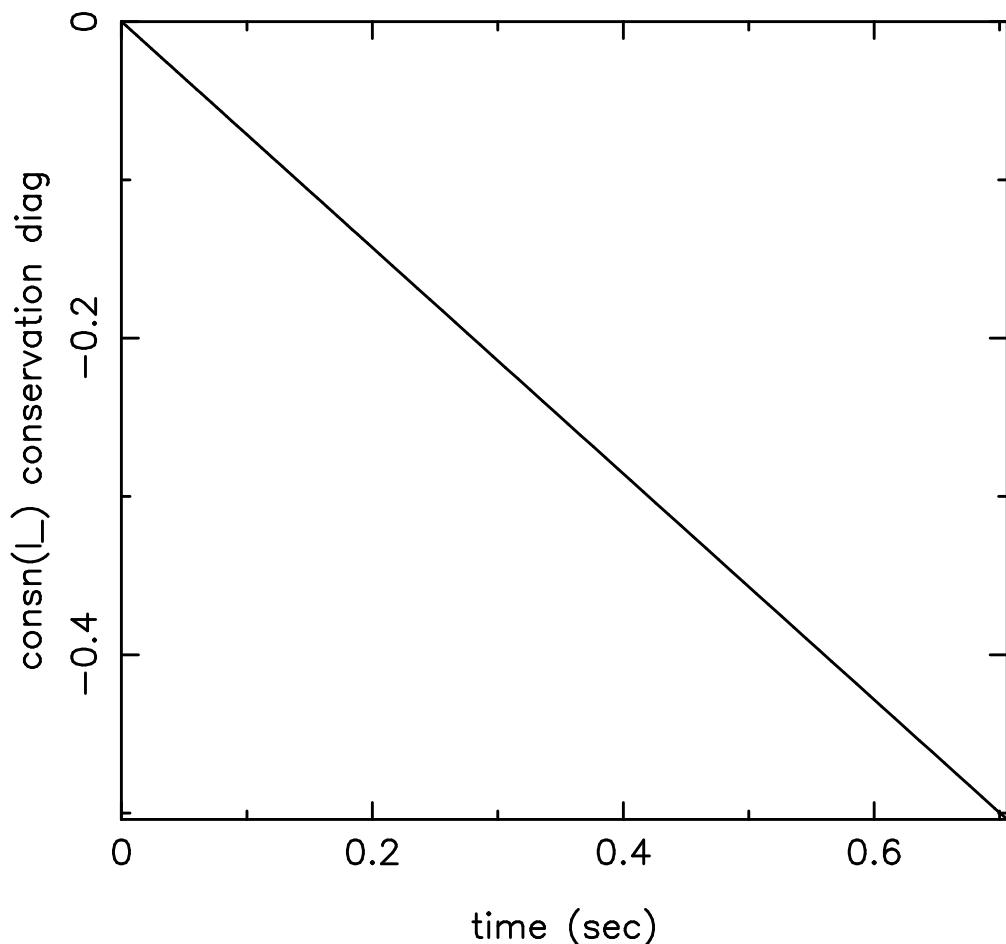
$\nu_0 = 7.7663E+04$  Hz



Species: 2 Current =-.7514E+01 Amps/cm<sup>2</sup>



Species: 2 Power = $0.2936\text{E}-15$  Watts/cc

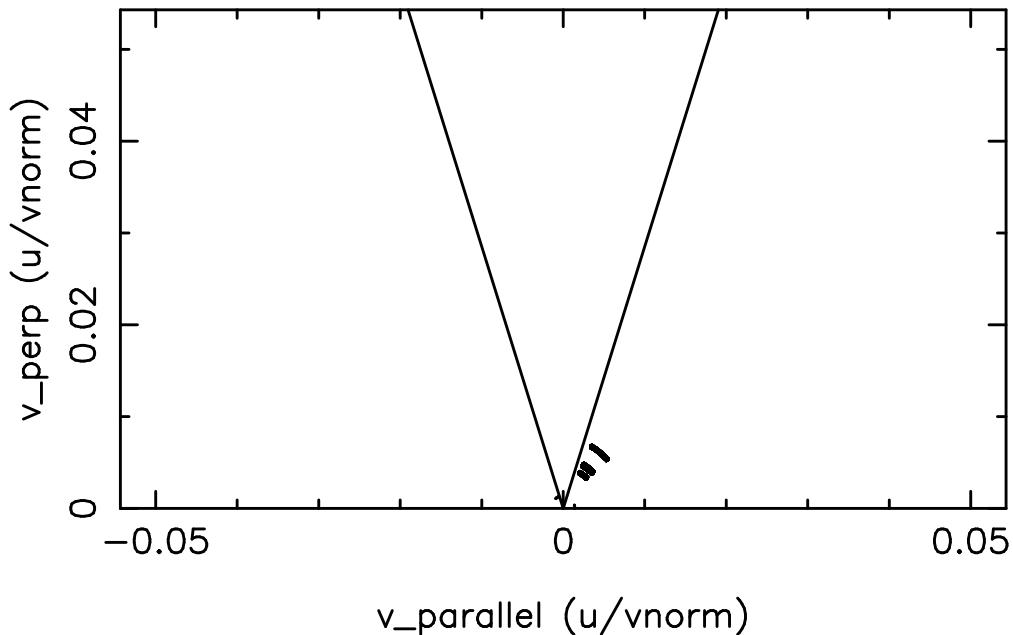


$\text{consn}(I_)$  =  $-5.0408E-01$

Perfect conservation should yield machine accuracy,  
or about  $1.e-14$ :

time step (n) is 100      time=  $7.0600E-01$  secs  
 $r/a$ =  $1.5519E-01$       radial position ( $R$ ) =  $1.8747E+02$  cm

Species 1 Source Function (units: dist. f/sec)



time step n= 100      time= 7.06E-01 secs  
 $r/a = 1.552E-01$       radial position ( $R$ )= 1.8747E+02 cm  
 $rya = 1.552E-01$        $R=rpcon= 1.8747E+02$  cm, Surf# 9

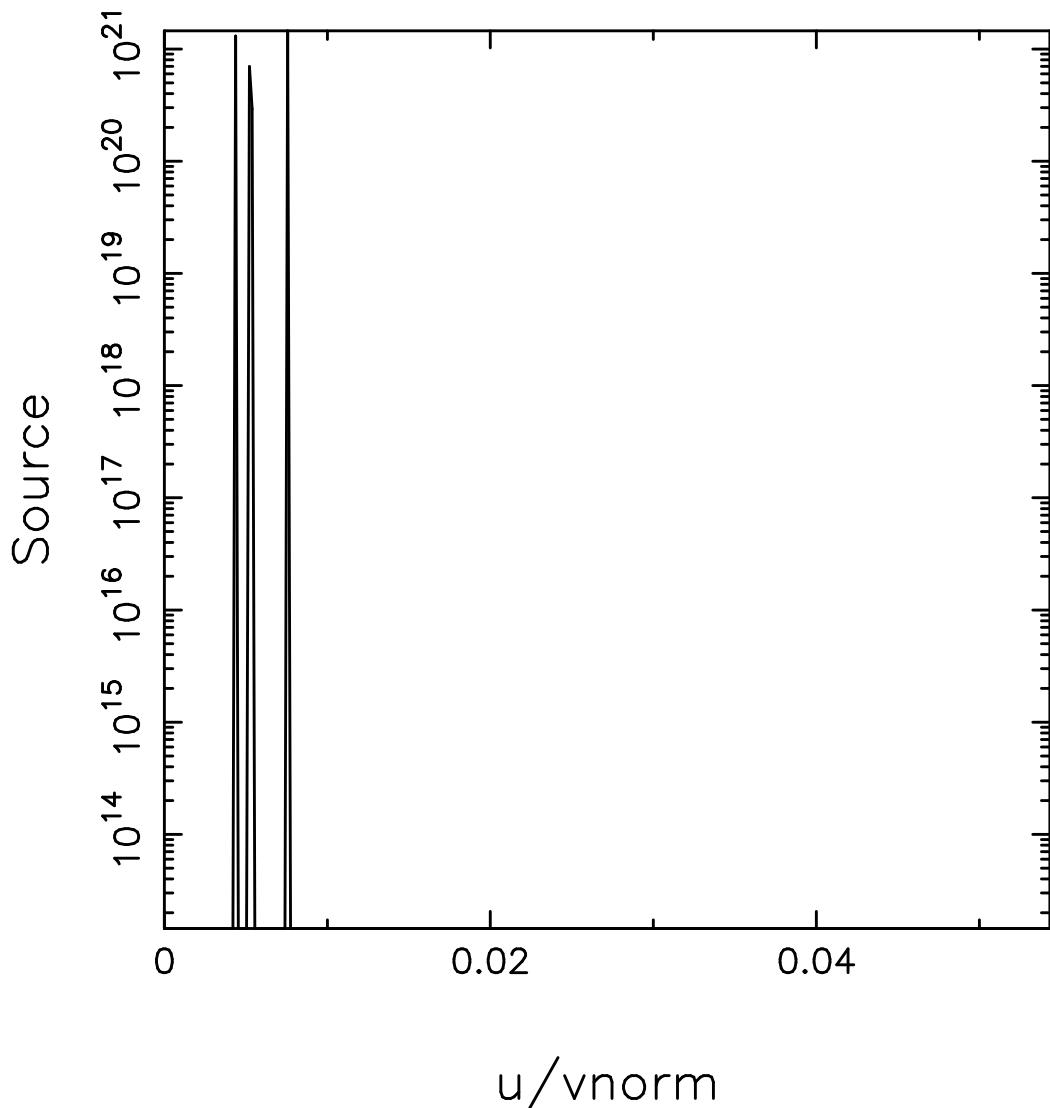
Particle source rate= 8.3018E+13 ptcls/cc/sec

Total source power [entr(..5..)]= 8.3776E-01 W/cc

Contour values:

1.2603E+10	5.0172E+10	1.9974E+11	7.9517E+11
3.1656E+12	1.2603E+13	5.0172E+13	1.9974E+14
7.9517E+14	3.1656E+15	1.2603E+16	5.0172E+16
1.9974E+17	7.9517E+17	3.1656E+18	1.2603E+19
5.0172E+19	1.9974E+20	7.9517E+20	3.1656E+21

## Pitch Angle Avg Source vs. u

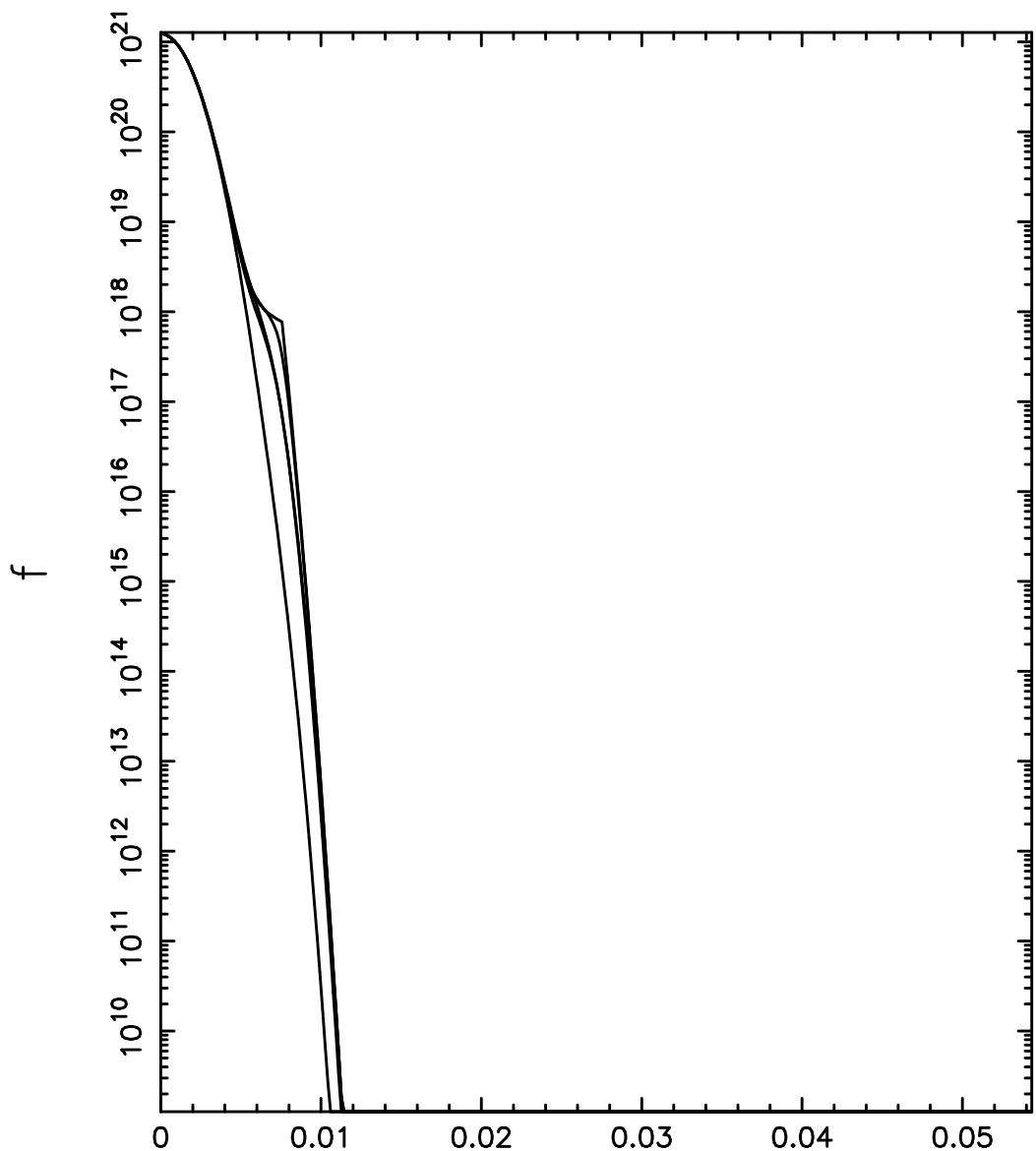


$u/vnorm$

Particle source integrated over theta0 for species 1  
(normed so  $\int(0,1)*2\pi*x**2*dx = \text{mid-plane source}$ )  
vnorm= 3.6947E+10 cm/s

time step (n) is 100 time= 7.0600E-01 secs  
r/a= 1.5519E-01 radial position (R) = 1.8747E+02 cm

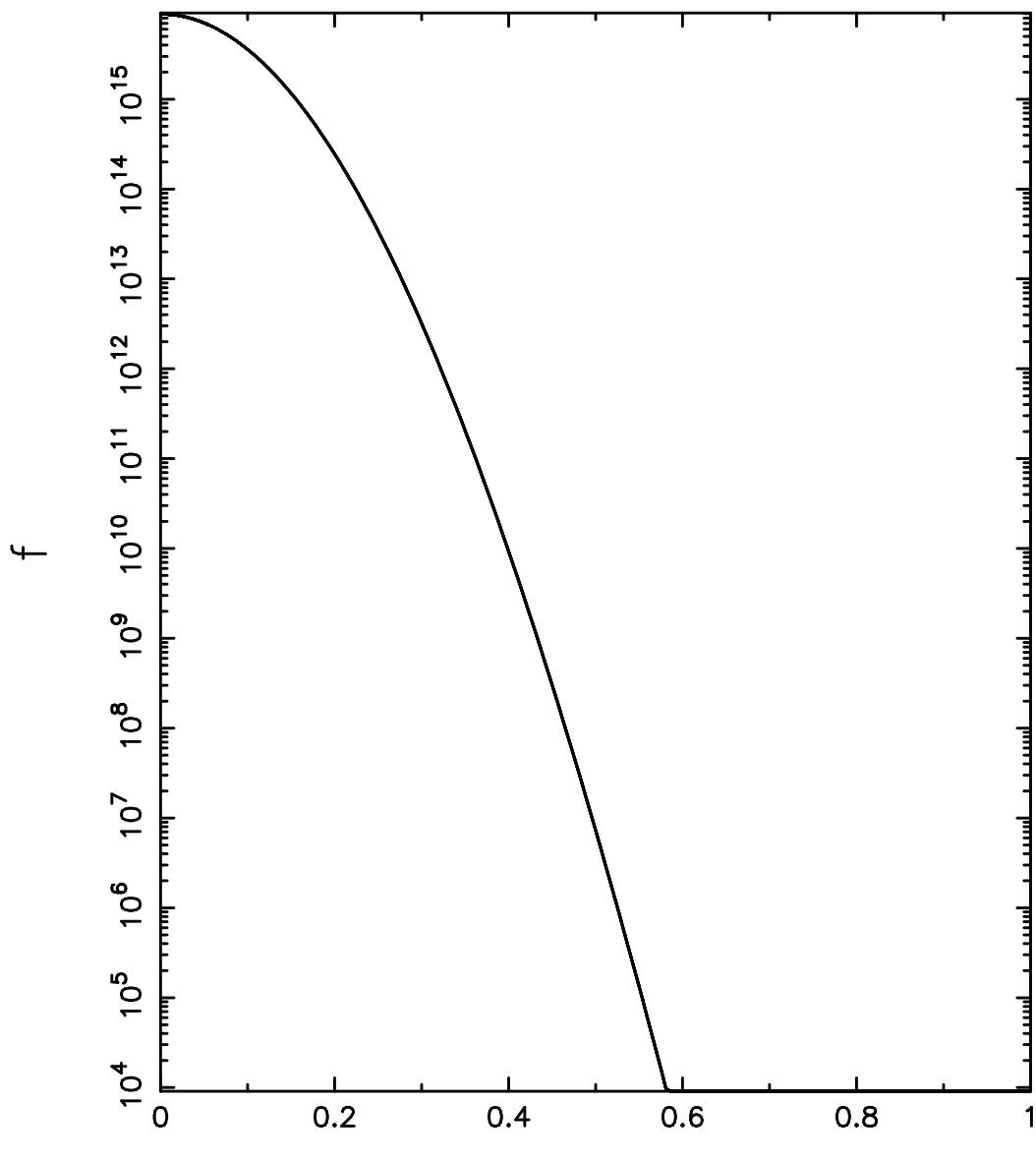
## Cuts of f vs. v, at cnst pitch angle



$u/v_{\text{norm}}$

Distribution function vs. velocity for some angles  
Species number=1, enorm= 3.00D+02  
time step (n)= 100 time= 0.706000E+00 secs  
r/a= 1.55E-01 radial position(R)= 1.875E+02 cm

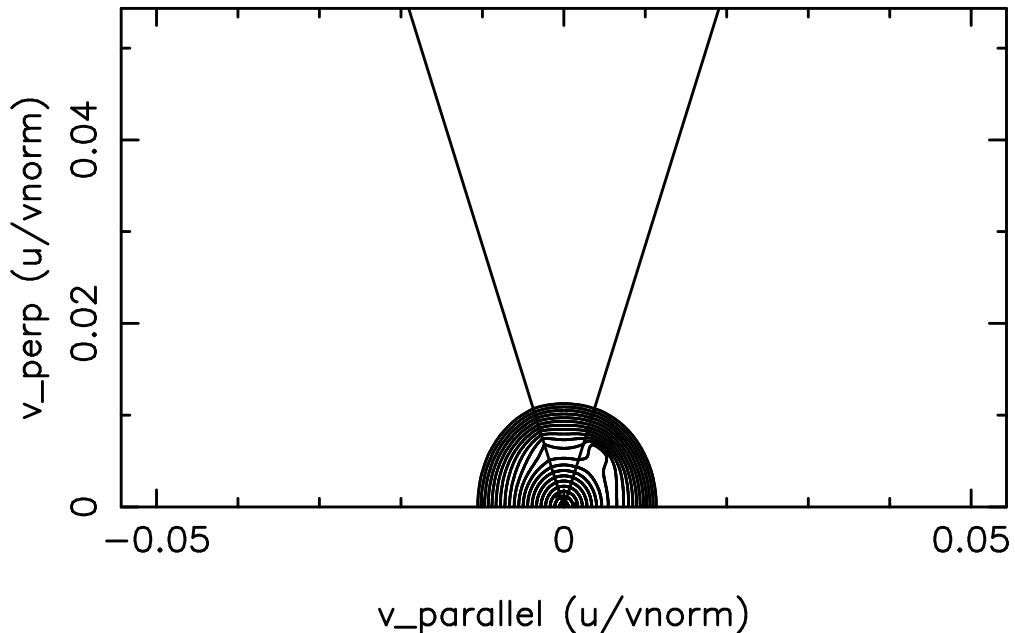
## Cuts of f vs. v, at cnst pitch angle



$u/v_{\text{norm}}$

Distribution function vs. velocity for some angles  
Species number=2, enorm= 3.00D+02  
time step (n)= 100 time= 0.706000E+00 secs  
r/a= 1.55E-01 radial position(R)= 1.875E+02 cm

### Species 1 Distribution Function Contour Plot

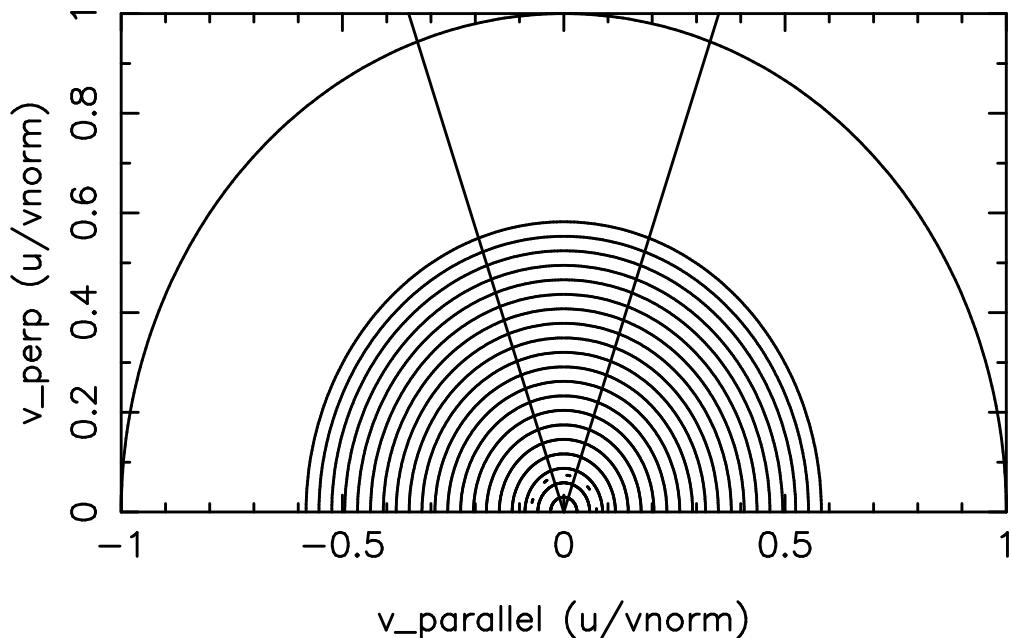


time step n= 100      time= 7.06E-01 secs  
 $r/a = 1.552E-01$       radial position (R)= 1.8747E+02 cm  
 $rya = 1.552E-01$       R=rpcon= 1.8747E+02 cm, Surf# 9

Contour values:

1.139019E+21	8.972920E+20	6.037787E+20	3.477403E+20
1.719026E+20	7.319341E+19	2.695225E+19	8.622703E+18
2.408732E+18	5.906631E+17	1.278513E+17	2.456711E+16
4.214851E+15	6.493568E+14	9.034887E+13	1.141604E+13
1.317073E+12	1.394678E+11	1.362339E+10	1.233458E+09

### Species 2 Distribution Function Contour Plot



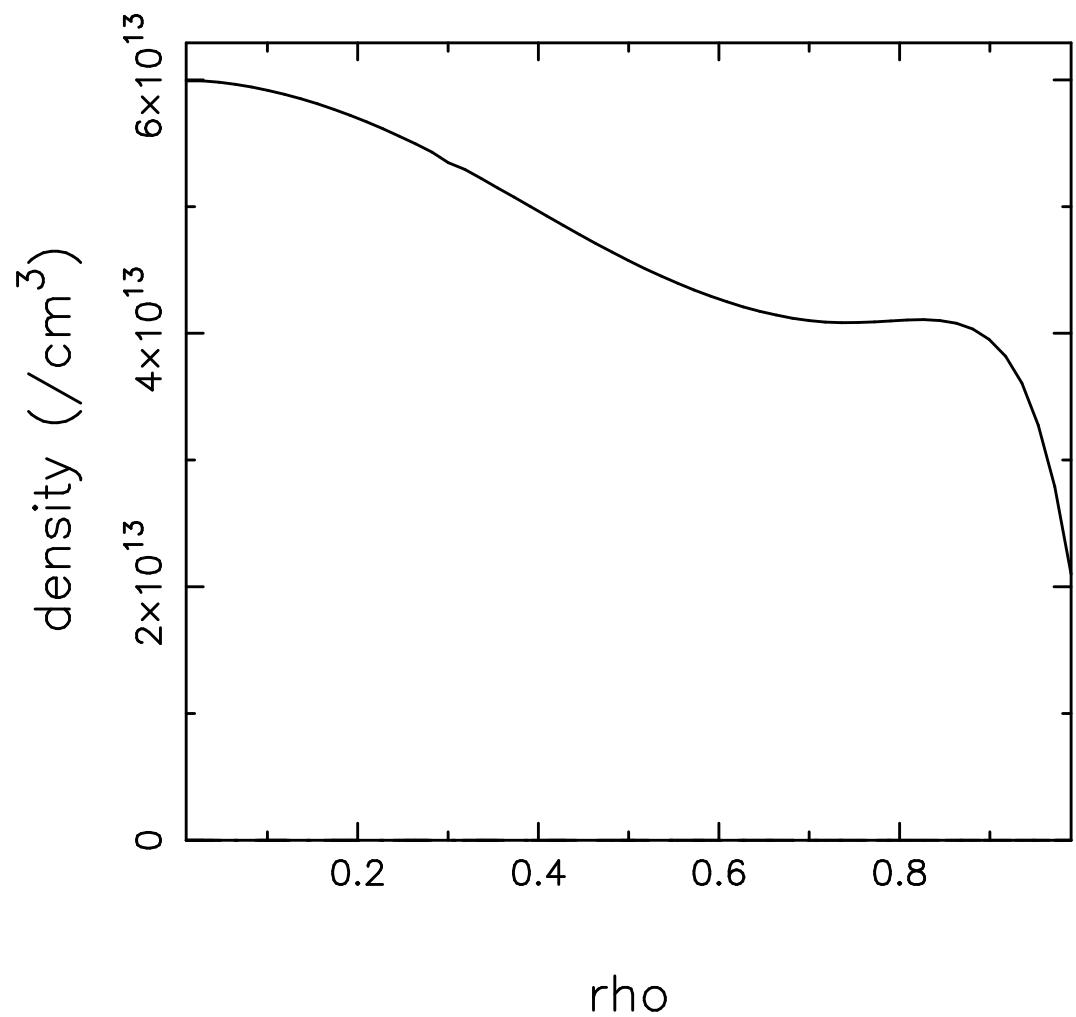
time step n= 100      time= 7.06E-01 secs  
 $r/a = 1.552E-01$       radial position ( $R$ )= 1.8747E+02 cm  
 $rya = 1.552E-01$        $R=rpcon= 1.8747E+02$  cm, Surf# 9

Contour values:

8.179376E+15	6.493984E+15	4.425093E+15	2.591697E+15
1.307263E+15	5.693049E+14	2.146925E+14	7.034688E+13
2.010253E+13	5.030225E+12	1.106916E+12	2.151661E+11
3.711644E+10	5.708605E+09	7.865395E+08	9.754229E+07
1.093921E+07	1.114574E+06	1.036406E+05	8.834175E+03

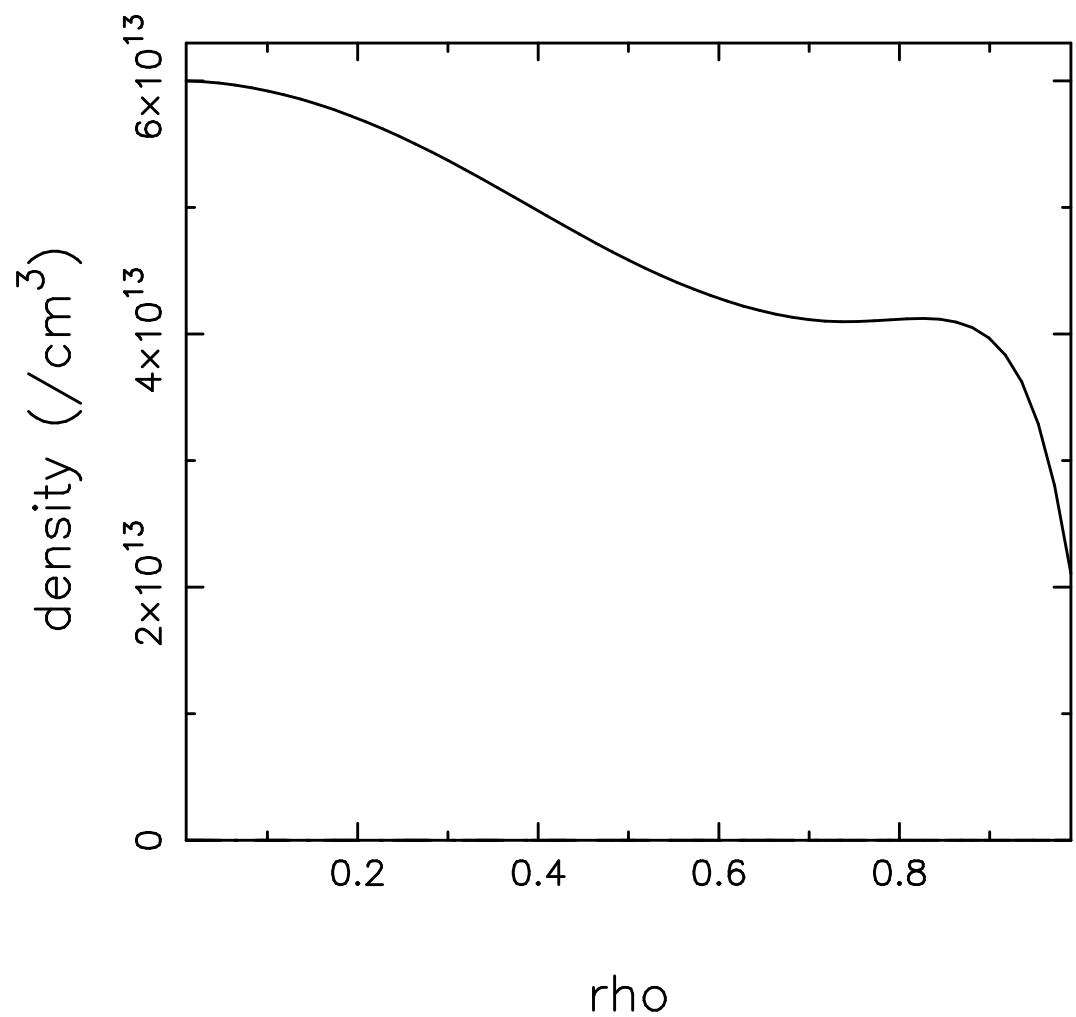
## DENSITIES (/CC) OF SPECIES

species no. 1 D general time step n= 100



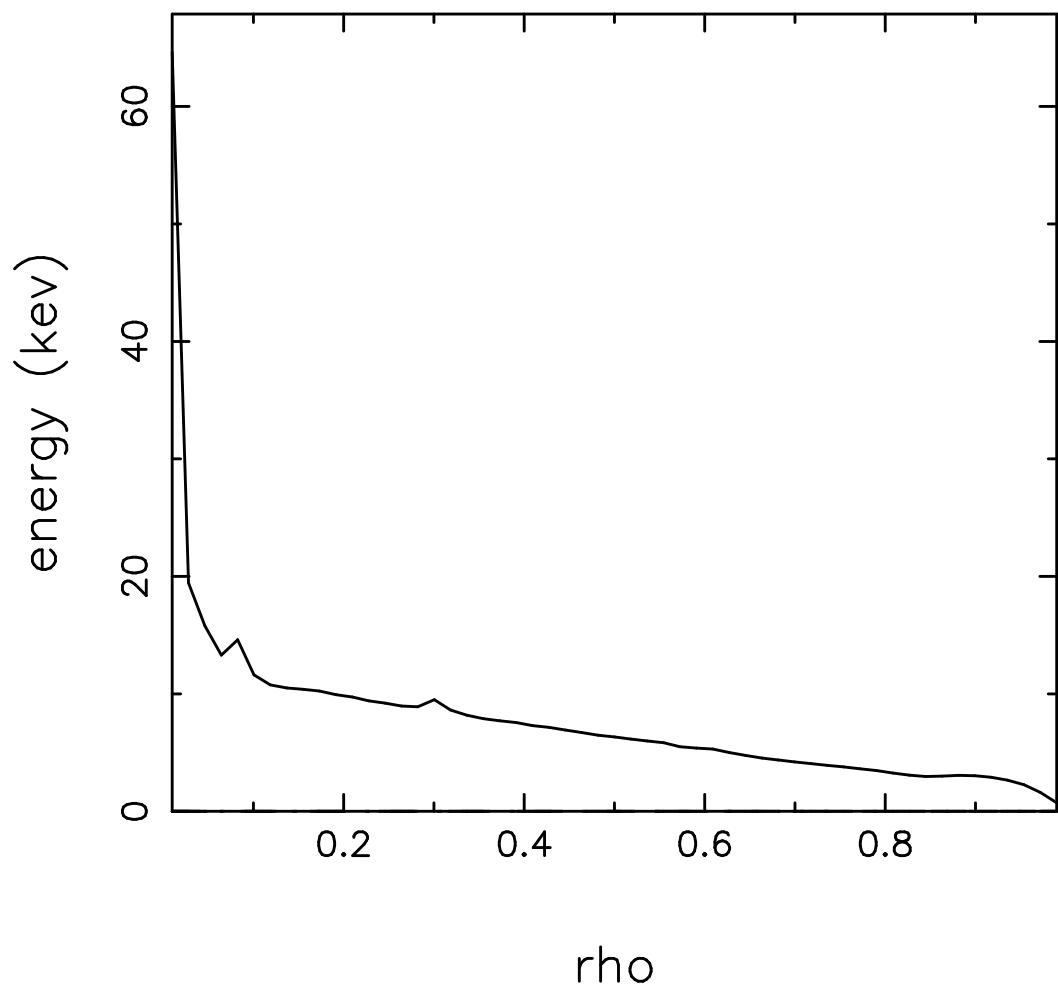
## DENSITIES (/CC) OF SPECIES

species no. 2 e general time step n= 100



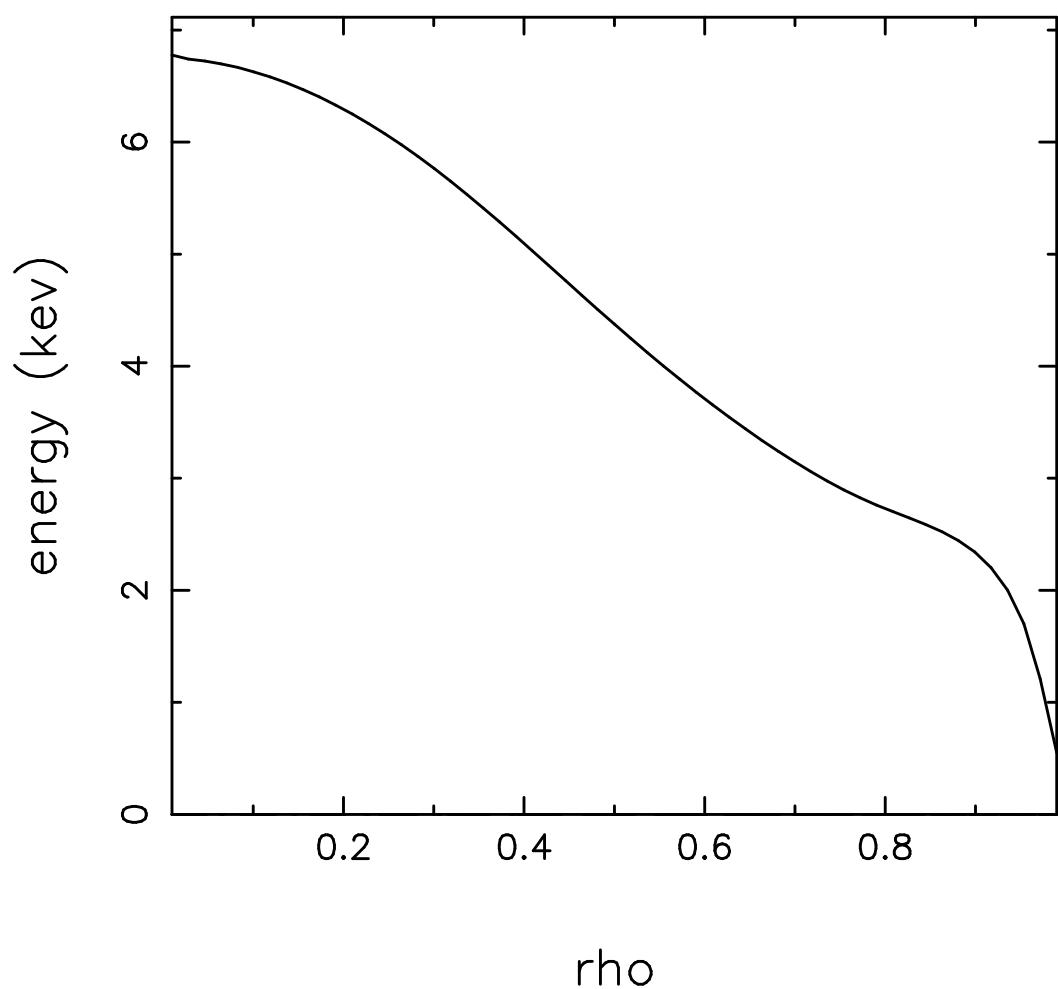
ENERGIES OF SPECIES IN KEV  
(Solid: <..>\_FSA)

species no. 1 D general time step n= 100



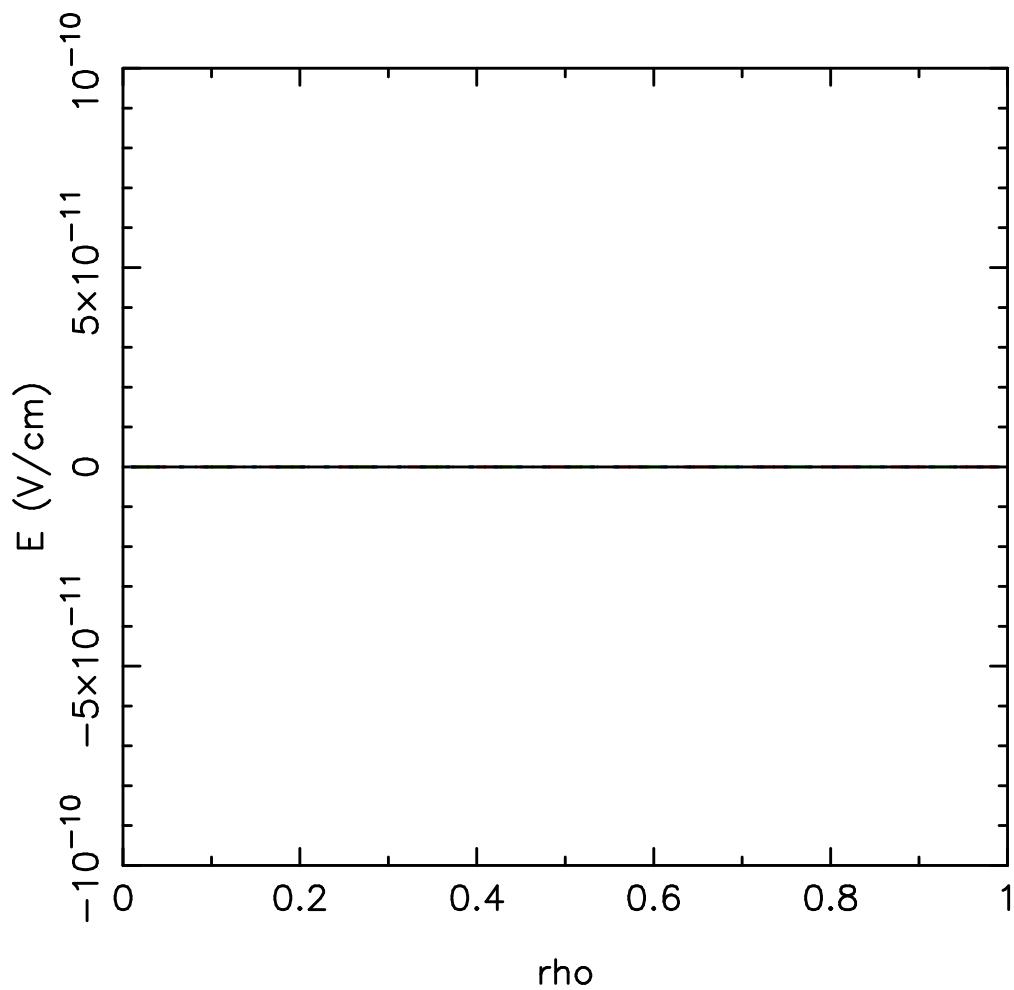
ENERGIES OF SPECIES IN KEV  
(Solid: <..>\_FSA)

species no. 2 e general time step n= 100



## Electric field (V/cm)

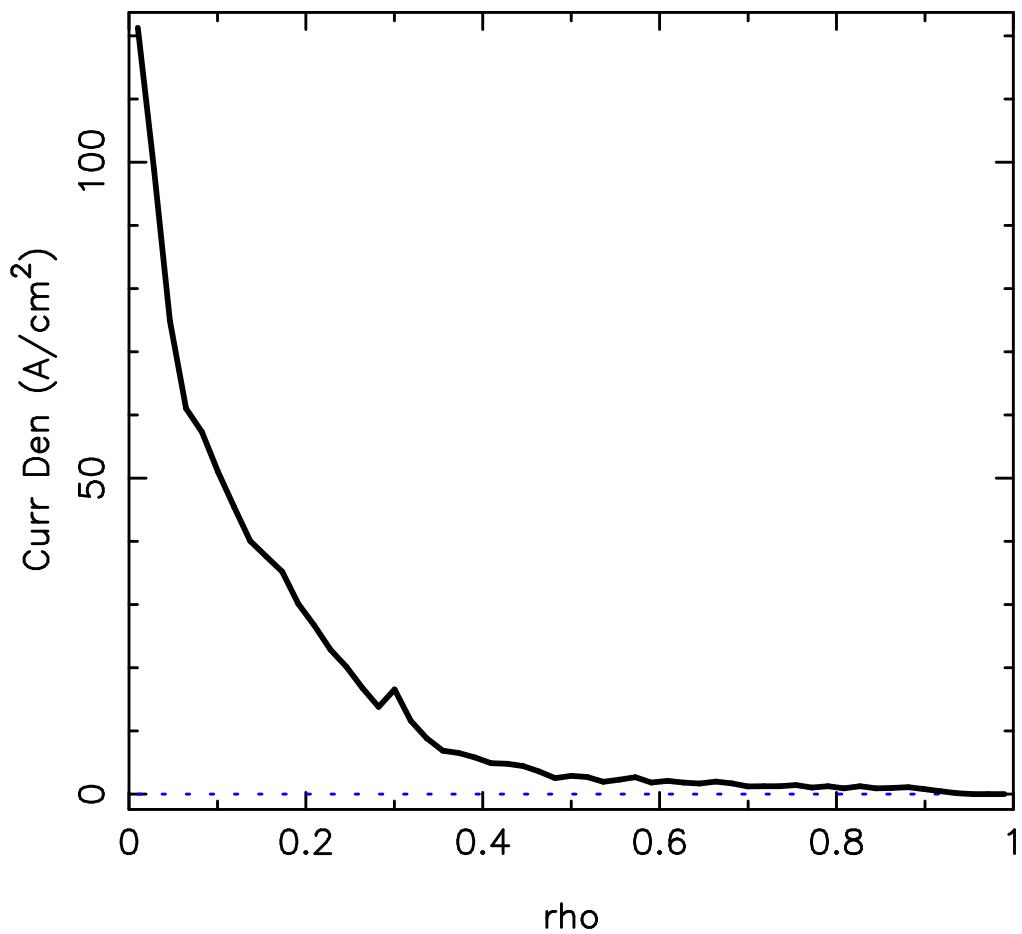
n= 1; t= 0.000000E+00sec  
n= 33; t= 1.280000E-01sec  
n= 67; t= 3.660000E-01sec  
n= 100; t= 6.960000E-01sec



# FLUX SURF. AV. CURNT. (AMPS/CM<sup>2</sup>)

Species: 1 Current from sum[curr\*darea]= 9.237432E+04 A

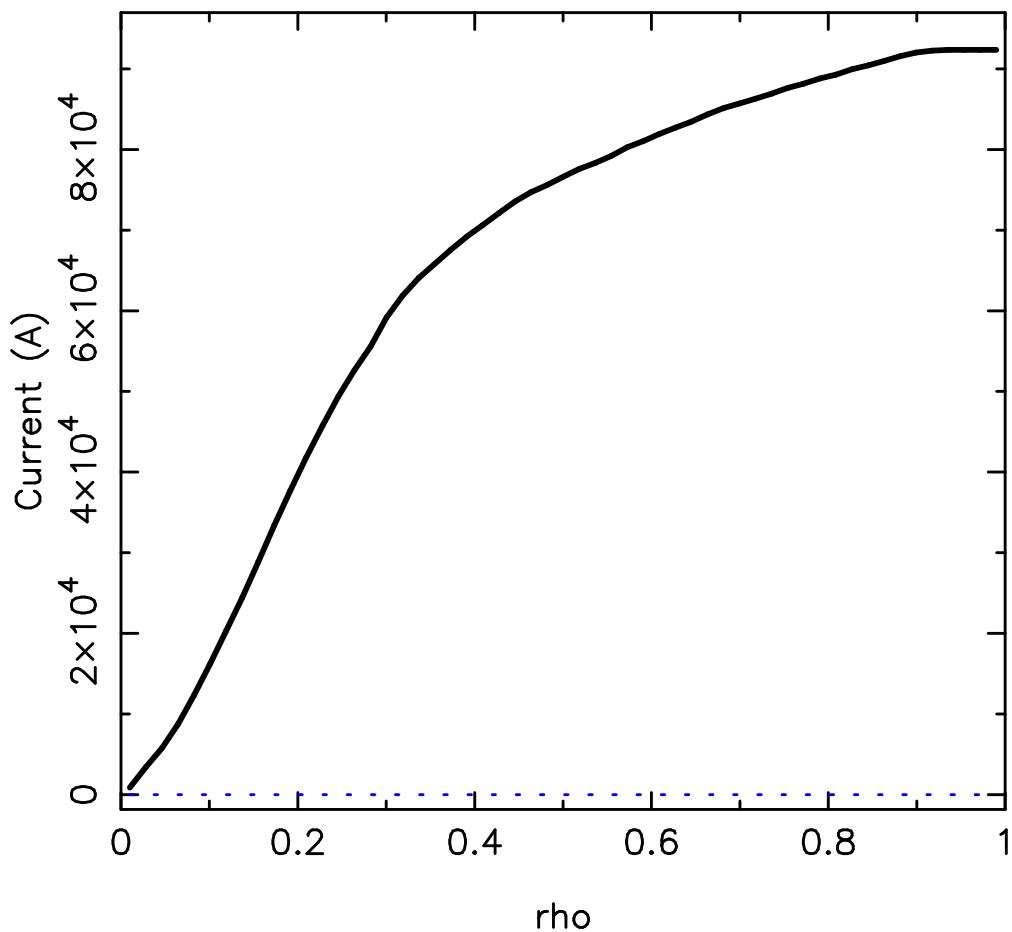
Blue/dotted: Bootstrap (fit model: bscurm() array) 0.000E+00A  
Solid/thin: Integral over f (curr() array) 9.237E+04A  
**Solid/bold: All the above together 9.237E+04A**



## Current (A) INTEGRATED UP TO RHO or PSI

Species: 1 Current from sum[curr\*darea]= 9.237432E+04 A

Blue/dotted: Bootstrap (fit model: bscurm() array) 0.000E+00A  
Solid/thin: From Integral over f (curr()) 9.237E+04A  
**Solid/bold:** From All the above together **9.237E+04A**



## FLUX SURF. AV. CURNT. (AMPS/CM<sup>2</sup>)

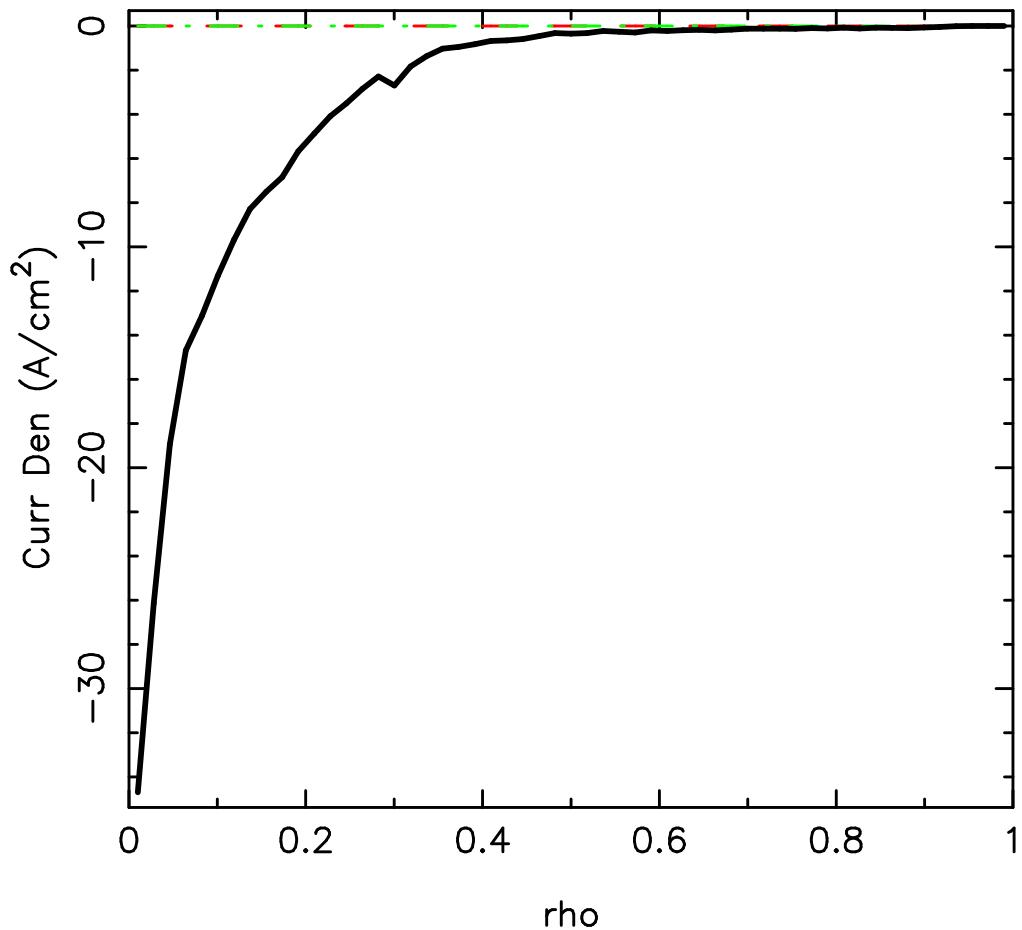
Species: 2 Current from sum[curr\*darea]= -1.598814E+04 A

Red-- (sigma\_coll\_neo-sigma\_banana)\*Ephi 0.000E+00A

Green-.— Bootstrap (fit model: bscurm()) 0.000E+00A

Solid/thin: Integral over f (curr() array) -1.599E+04A

**Solid/bold:** All the above together **-1.599E+04A**



## Current (A) INTEGRATED UP TO RHO or PSI

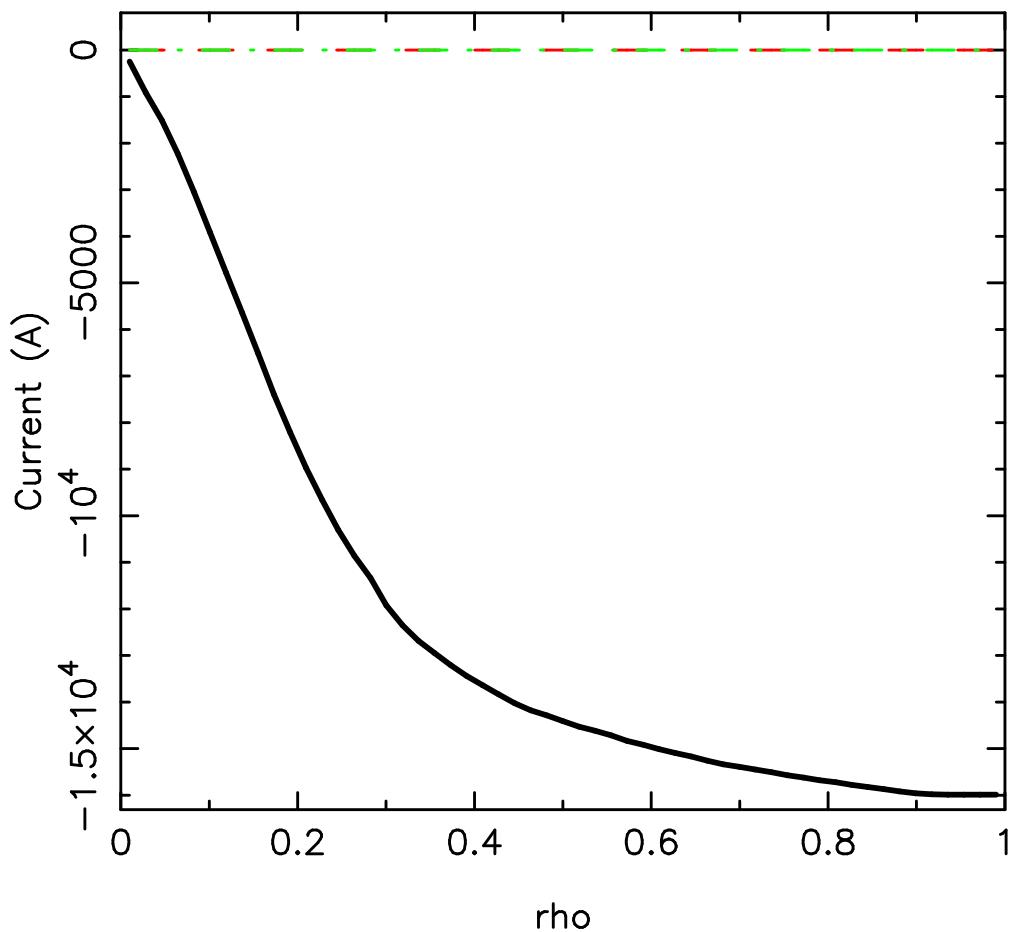
Species: 2 Current from sum[curr\*darea]= -1.598814E+04 A

Red-- (sigma\_coll\_neo-sigma\_banana)\*Ephi 0.000E+00A

Green-.— Bootstrap (fit model: bscurm()) 0.000E+00A

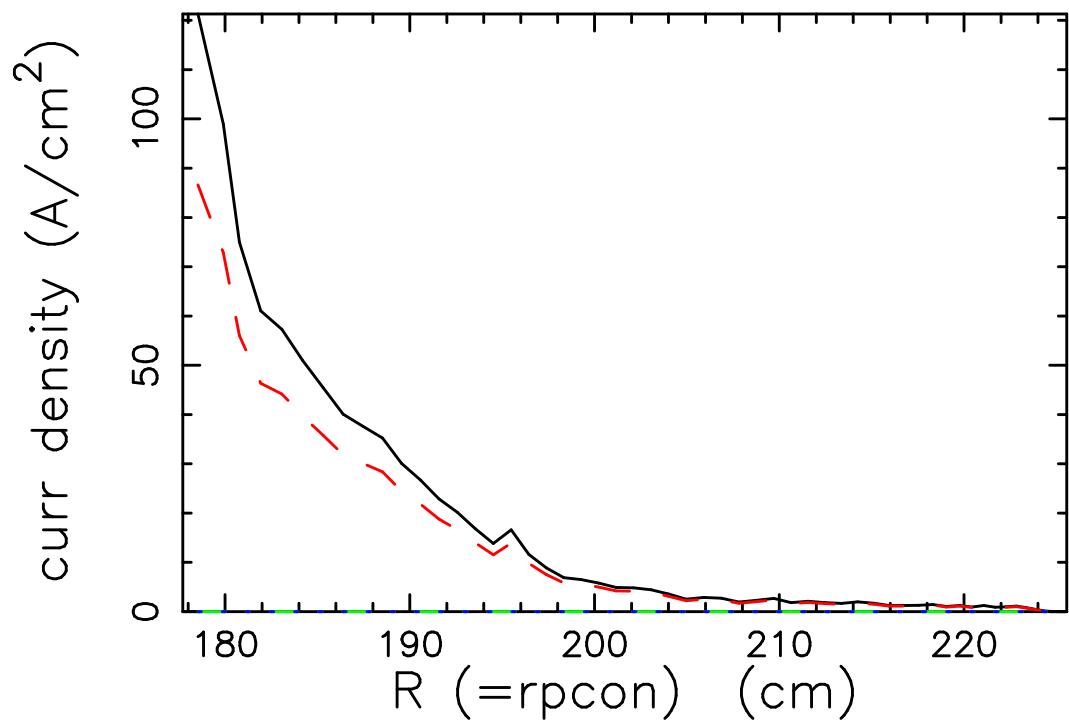
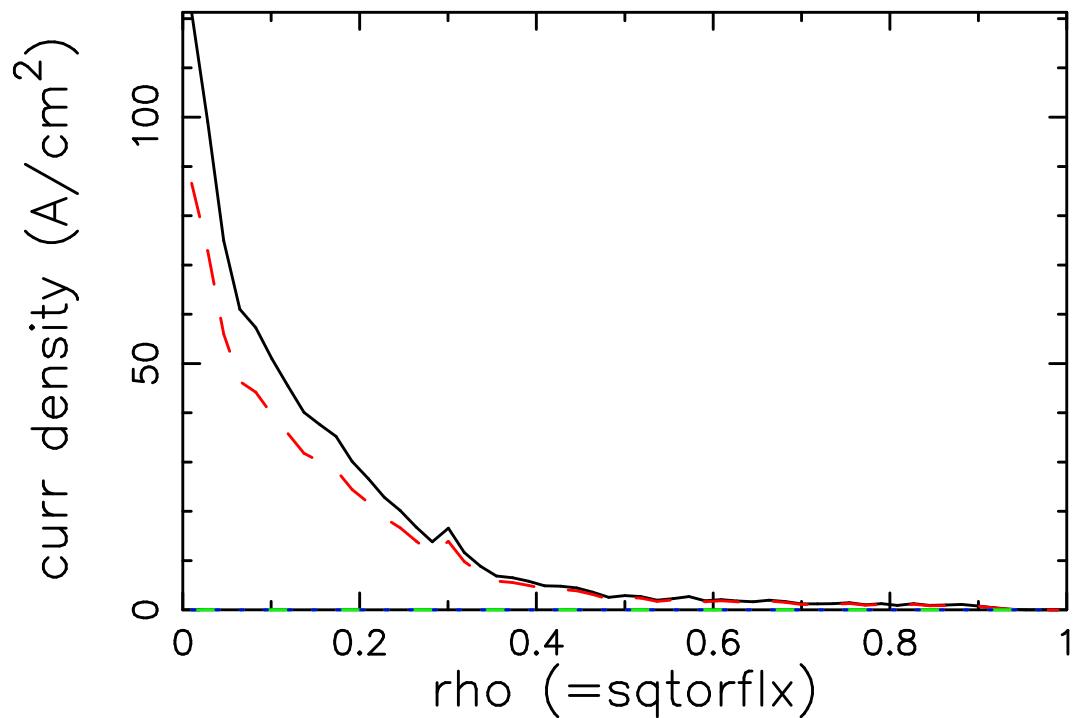
Solid/thin: From Integral over f (curr()) -1.599E+04A

**Solid/bold:** From All the above together -1.599E+04A



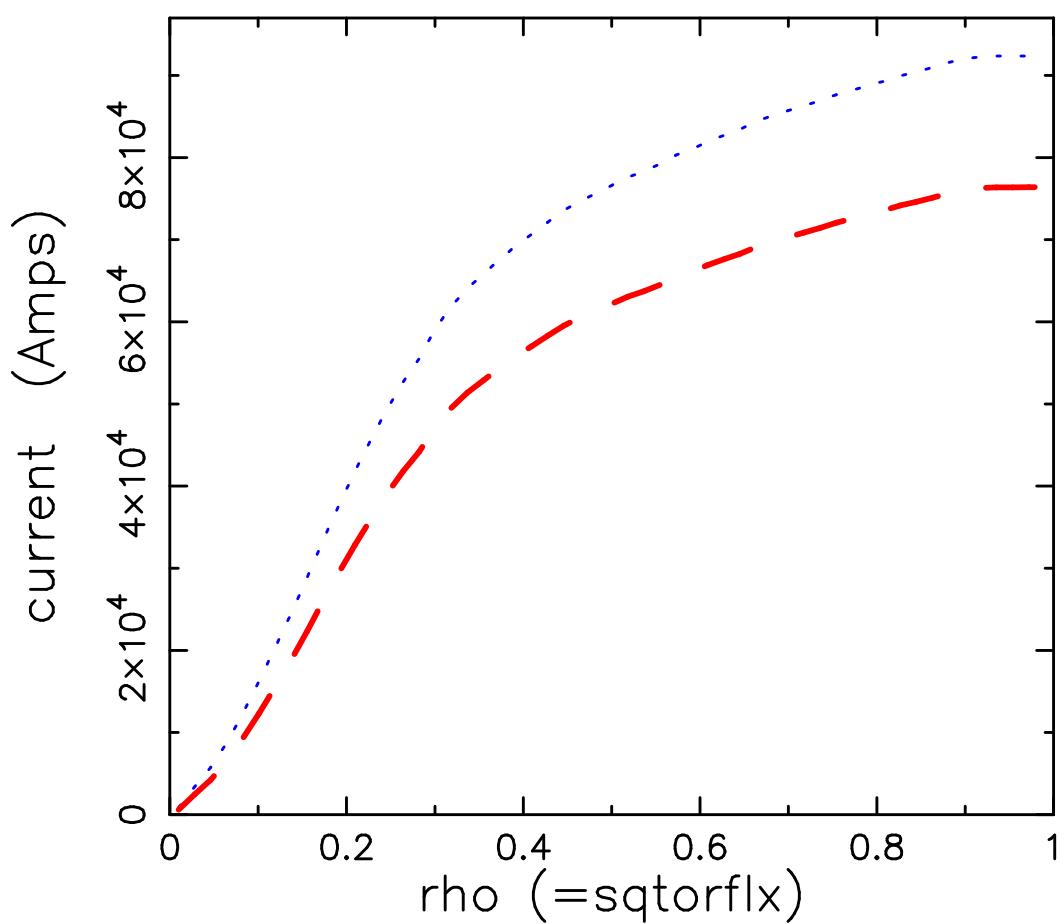
## CURRENT (AMPS/CM<sup>2</sup>)

fi [solid] = 9.237E+04      fi+e[---] = 7.639E+04  
bs\_e[---] = 0.000E+00      bs\_i[.....] = 0.000E+00 Amps



CURRENT (AMPS)  
(INTEGRATED UP TO RHO or PSI)

Blue/dotted: using currz(k,lr) over ionic general species  
Red/dashed: using curr(k,lr) over all general species



## SOURCE POWER: (WATTS/CC)

rho	NBI(orKO)+RF	NBI(or KO)	RF(1)	RF(2)	RF(3)
rho	(sorpwt)	(sorpw_nbi)	(sorpw_rf for gen.species 1,2,3)		
1.000E-02	6.785E+00	1.127E+00	5.658E+00	0.000E+00	
2.815E-02	2.186E+00	1.177E+00	1.009E+00	0.000E+00	
4.630E-02	1.696E+00	1.096E+00	6.001E-01	0.000E+00	
6.444E-02	1.395E+00	1.064E+00	3.310E-01	3.015E-15	
8.259E-02	1.095E+00	1.031E+00	6.453E-02	6.020E-10	
1.007E-01	9.743E-01	9.656E-01	8.656E-03	2.464E-10	
1.189E-01	9.360E-01	9.360E-01	5.342E-15	2.346E-12	
1.370E-01	8.679E-01	8.679E-01	-9.892E-38	3.128E-14	
1.552E-01	8.379E-01	8.379E-01	-1.259E-65	2.936E-16	
1.733E-01	8.026E-01	8.026E-01	-4.592E-105	1.561E-18	
1.915E-01	7.300E-01	7.300E-01	-2.709E-114	3.962E-21	
2.096E-01	6.839E-01	6.839E-01	-3.709E-89	4.079E-24	
2.278E-01	6.108E-01	6.108E-01	-8.670E-65	1.379E-27	
2.459E-01	5.727E-01	5.727E-01	-1.540E-42	1.223E-31	
2.641E-01	5.252E-01	5.252E-01	8.469E-20	9.417E-38	
2.822E-01	5.101E-01	4.945E-01	1.560E-02	0.000E+00	
3.004E-01	2.408E+00	4.687E-01	1.939E+00	0.000E+00	
3.185E-01	4.721E-01	4.336E-01	3.855E-02	0.000E+00	
3.367E-01	4.090E-01	4.090E-01	1.145E-11	0.000E+00	
3.548E-01	3.661E-01	3.661E-01	-2.026E-40	0.000E+00	
3.730E-01	3.509E-01	3.509E-01	-6.428E-82	0.000E+00	
3.911E-01	3.421E-01	3.421E-01	-3.244E-144	0.000E+00	
4.093E-01	3.123E-01	3.123E-01	-1.614E-77	0.000E+00	
4.274E-01	3.090E-01	3.090E-01	5.729E-29	0.000E+00	
4.456E-01	2.915E-01	2.912E-01	2.715E-04	0.000E+00	
4.637E-01	2.753E-01	2.709E-01	4.359E-03	0.000E+00	
4.819E-01	2.588E-01	2.588E-01	1.369E-06	0.000E+00	
5.000E-01	2.573E-01	2.573E-01	4.155E-36	0.000E+00	
5.181E-01	2.527E-01	2.527E-01	-2.128E-80	0.000E+00	
5.363E-01	2.466E-01	2.466E-01	-1.873E-60	0.000E+00	
5.544E-01	2.481E-01	2.481E-01	1.767E-13	0.000E+00	
5.726E-01	3.655E-01	2.378E-01	1.277E-01	0.000E+00	
5.907E-01	2.420E-01	2.245E-01	1.751E-02	0.000E+00	
6.089E-01	2.281E-01	2.281E-01	5.626E-10	0.000E+00	
6.270E-01	2.078E-01	2.078E-01	-5.396E-57	0.000E+00	
6.452E-01	1.902E-01	1.902E-01	-3.051E-129	0.000E+00	
6.633E-01	1.465E-01	1.465E-01	-5.093E-239	0.000E+00	
6.815E-01	1.104E-01	1.104E-01	0.000E+00	0.000E+00	
6.996E-01	9.880E-02	9.880E-02	0.000E+00	0.000E+00	
7.178E-01	9.527E-02	9.527E-02	0.000E+00	0.000E+00	

7.359E-01	8.302E-02	8.302E-02	0.000E+00	0.000E+00
7.541E-01	6.015E-02	6.015E-02	0.000E+00	0.000E+00
7.722E-01	3.716E-02	3.716E-02	0.000E+00	0.000E+00
7.904E-01	2.421E-02	2.421E-02	0.000E+00	0.000E+00
8.085E-01	1.648E-02	1.648E-02	2.387-298	0.000E+00
8.267E-01	2.269E-02	2.269E-02	5.776-176	0.000E+00
8.448E-01	1.630E-02	1.630E-02	2.134E-87	0.000E+00
8.630E-01	1.795E-02	1.795E-02	3.076E-28	0.000E+00
8.811E-01	2.030E-02	2.030E-02	5.704E-07	0.000E+00
8.993E-01	1.651E-02	1.644E-02	6.468E-05	0.000E+00
9.174E-01	1.587E-02	1.587E-02	2.351E-07	0.000E+00
9.356E-01	7.899E-03	7.899E-03	9.480E-39	0.000E+00
9.537E-01	1.434E-03	1.434E-03	1.333-141	0.000E+00
9.719E-01	2.014E-03	2.014E-03	0.000E+00	0.000E+00
9.900E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Power integr.over rad. (RF+NBI(or KO), all gen.species)= 4.4415E+06Watts

Power from NBI(or KO) (sorpw\_nbii)= 3.7826E+06Watts

Power from RF (sorpw\_rfi) Gen.species no.1 = 6.5896E+05Watts

Power from RF (sorpw\_rfi) Gen.species no.2 = 6.3094E-05Watts

### DEPOSITED POWER: (WATTS/CC)

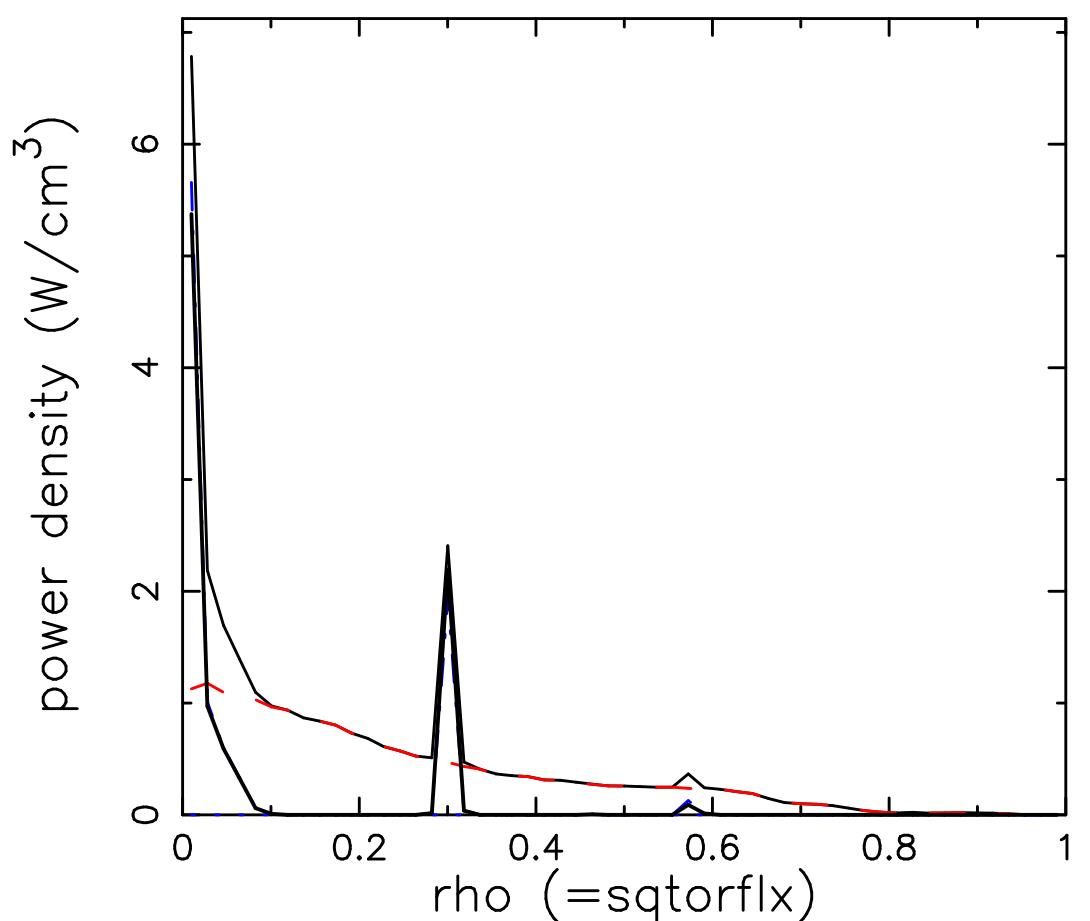
0.736	0.00E+00						
0.754	0.00E+00						
0.772	0.00E+00						
0.790	0.00E+00						
0.809	0.24-297	0.24-297	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.827	0.58-175	0.58-175	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.845	0.22E-86	0.22E-86	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.863	0.35E-27	0.35E-27	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.881	0.58E-06	0.58E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.899	0.21E-04	0.21E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.917	0.14E-06	0.14E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.936	0.88E-38	0.88E-38	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.954	0.20-141	0.20-141	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.972	0.00E+00						
0.990	0.00E+00						

Power sources integr. over rad. (RF+NBI, all gen.species)= 4.4415E+06W  
 Power from intern ray diagnostic[powurf(0)]= 6.9816E+05W

mode/harmonic krf, nharm(krf), powurf(krf)=	1	5	1.1551E+01
mode/harmonic krf, nharm(krf), powurf(krf)=	2	6	4.3127E+04
mode/harmonic krf, nharm(krf), powurf(krf)=	3	7	5.3915E+05
mode/harmonic krf, nharm(krf), powurf(krf)=	4	8	1.1424E+05
mode/harmonic krf, nharm(krf), powurf(krf)=	5	9	1.6325E+03
mode/harmonic krf, nharm(krf), powurf(krf)=	6	0	6.3281E-05

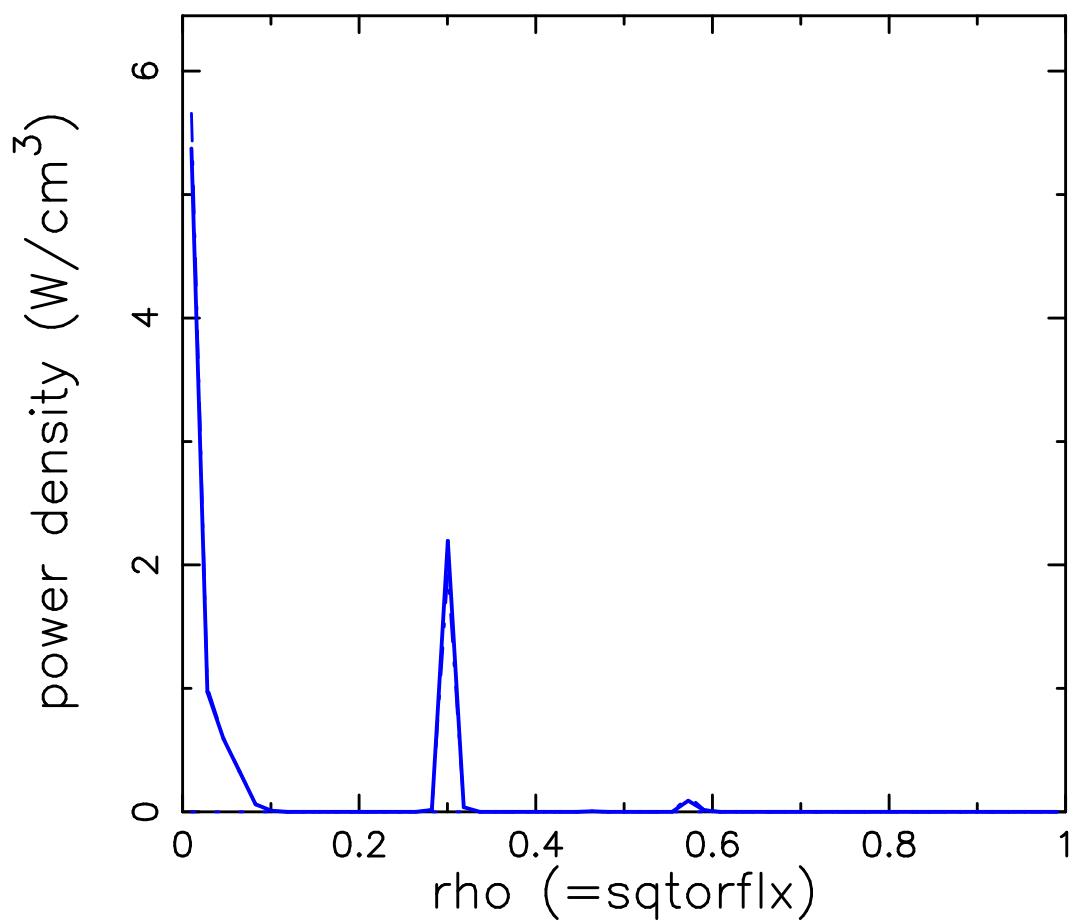
Power by collisions (from ray data) = 0.0000E+00W  
 Power by linear damping (from ray data)= 0.0000E+00W

FSA SOURCE POWER DEN: (WATTS/CM<sup>3</sup>)  
 Solid: NBI(or KO)+RF for all gen.sp.[sorpwt]  
 Dashed: NBI (or KO) [sorpw\_nbi]  
 Solid-bold: total absorbed RF power [powrft]  
 Other: RF general species (each) [sorpw\_rf]

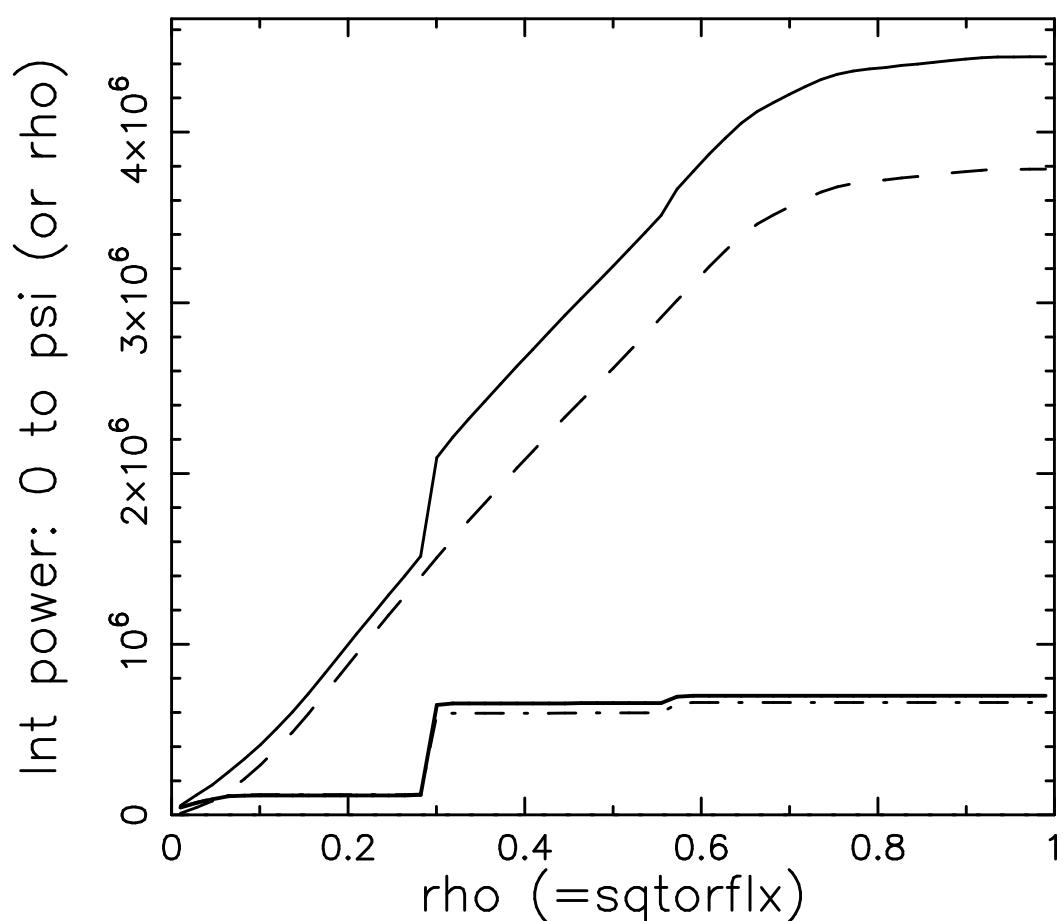


FSA RF POWER DEN: (WATTS/CM<sup>3</sup>)

Solid—bold: total absorbed RF power [powrft]  
Other: RF general species (each) [sorpw\_rf]

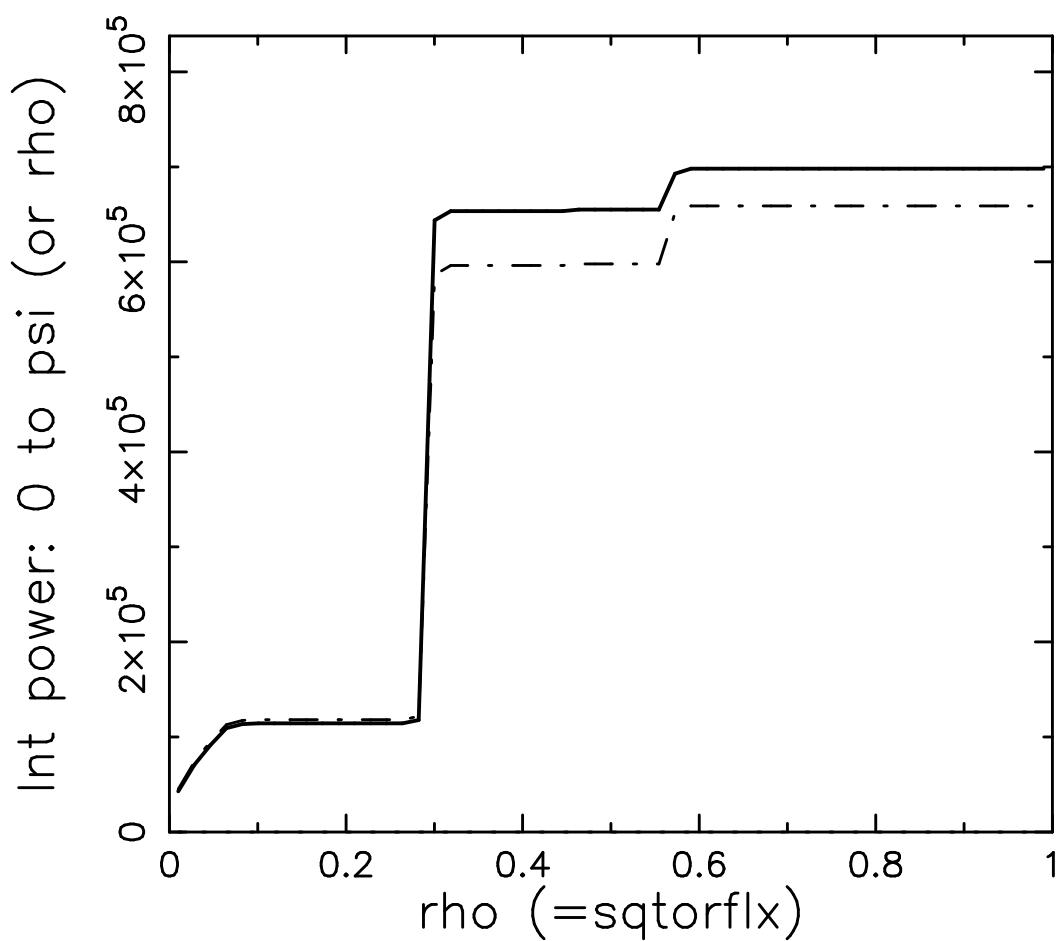


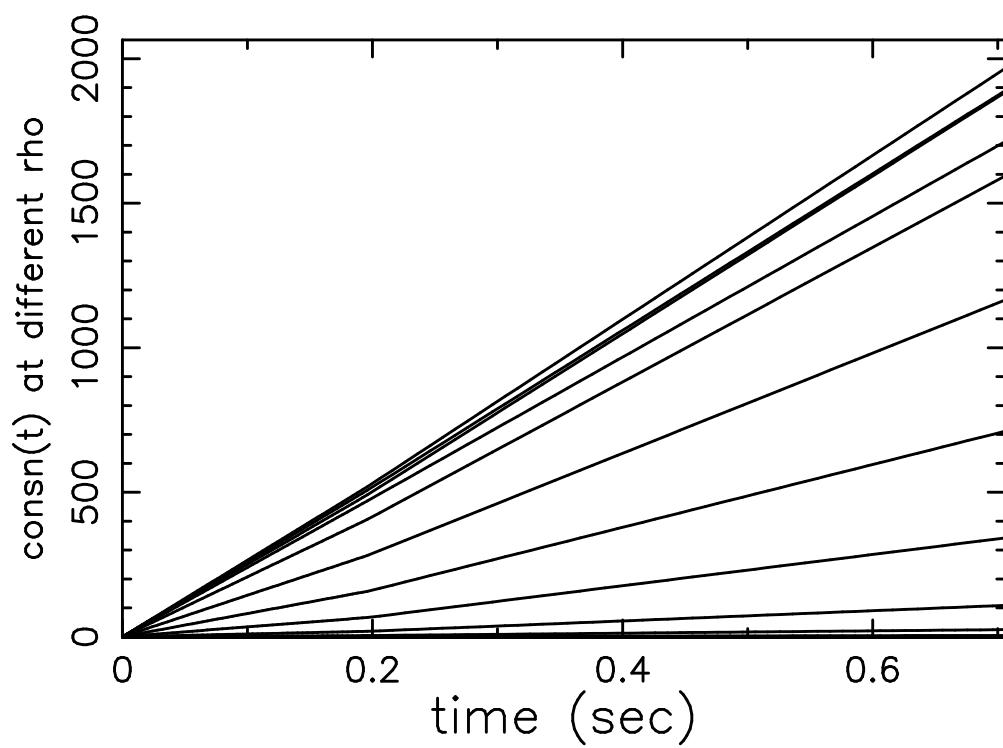
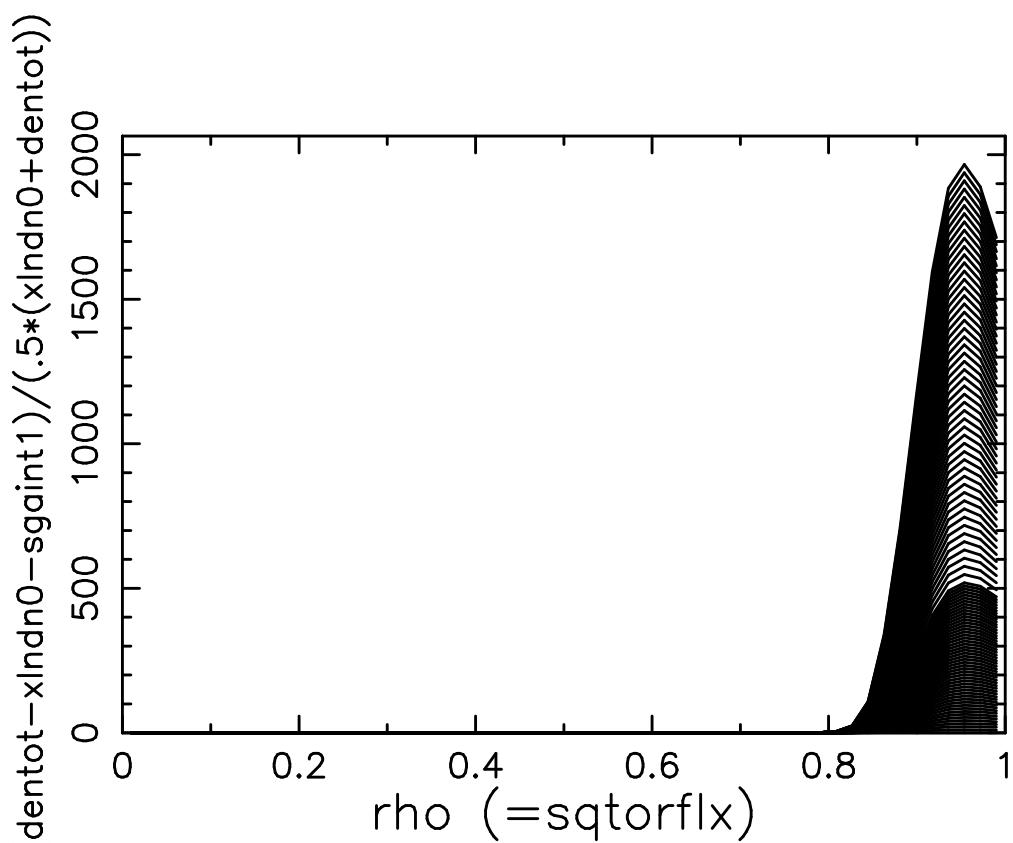
SOURCE POWER (integr. up to rho or psi) (WATTS)  
 Solid: NBI(or KO)+RF for all gen.sp.[sorpwti]  
 Dashed: NBI(or KO) [sorpw\_nbii]  
 Solid-bold: total absorbed RF [powurfi(\*,0)]  
 Other: RF general ions (each) [sorpw\_rfi]



## RF POWER (integr. up to rho or psi) (WATTS)

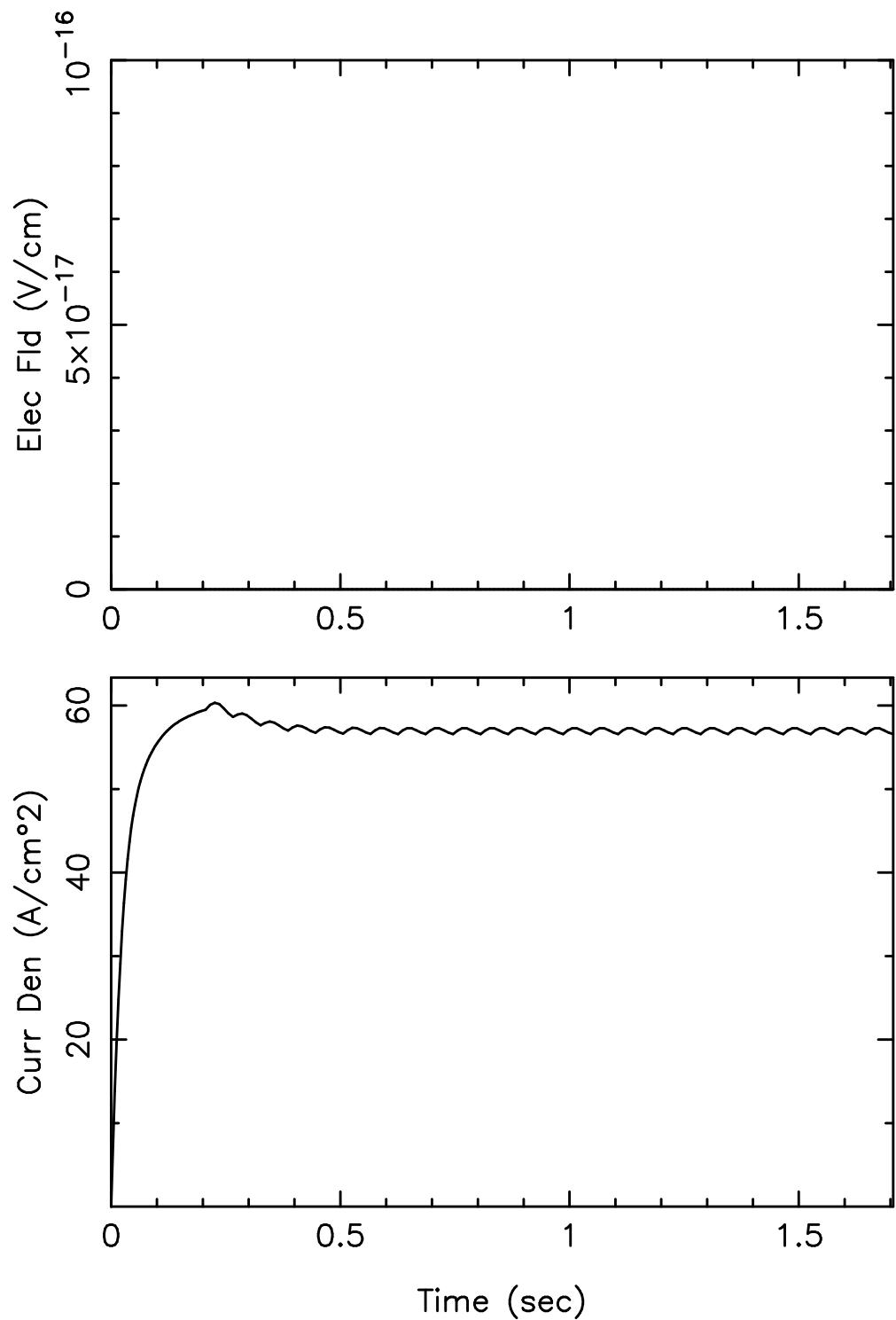
Solid—bold: total absorbed RF [powurfi(\*,0)]  
Other: RF general species (each) [sorpw\_rfi]





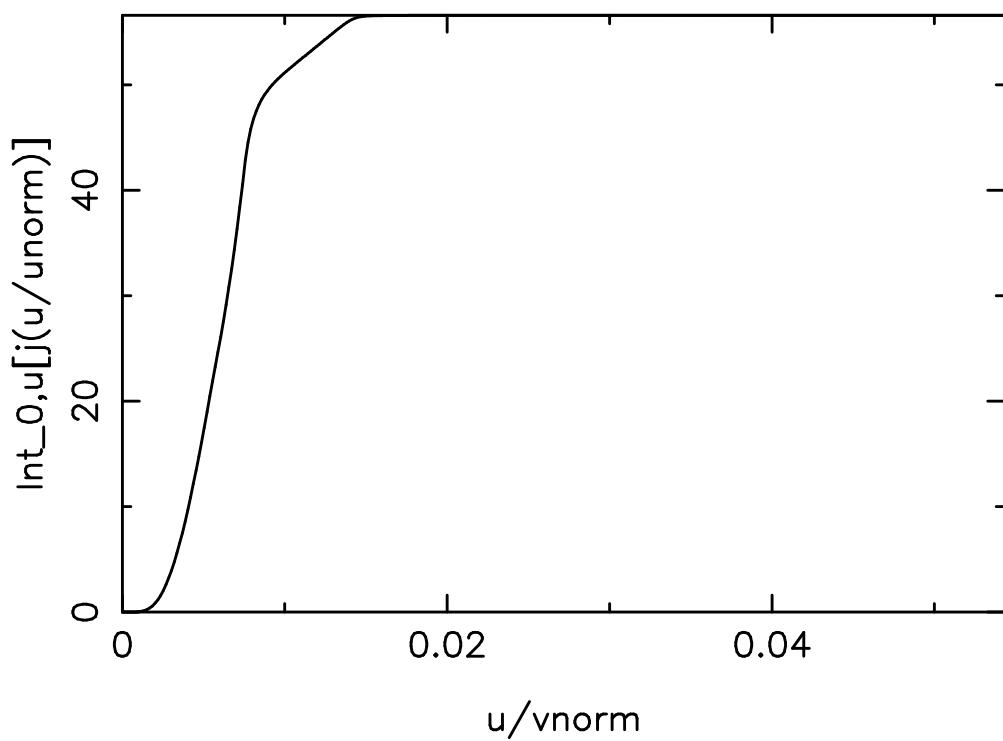
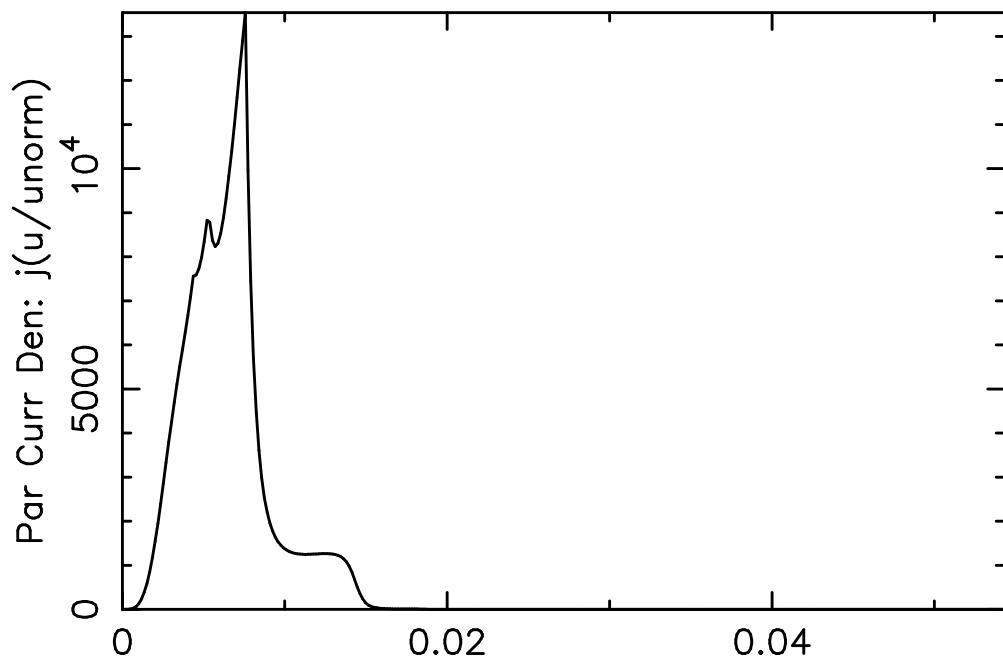
## LOCAL RADIAL QUANTITIES

```
time step n= 200,      time= 1.7060E+00 secs
flux surf= 5      total flux surfs= 55
r/a= 8.259E-02      radial position (R)= 1.8308E+02 cms
rya= 8.259E-02      R=rpcon= 1.831E+02 cm
    enormi, enorme(=enorm) (kev) = 3250.000      300.000
vnorm/c = 1.2324136
vthe (sqrt(te/me))/c = 0.0926848
vthe/vnorm = 0.0752059
k= 1 vth(k)/vnorm = 0.0014334
k= 2 vth(k)/vnorm = 0.0752059
k= 3 vth(k)/vnorm = 0.0014334
k= 4 vth(k)/vnorm = 0.0001432
k= 5 vth(k)/vnorm = 0.0752059
```

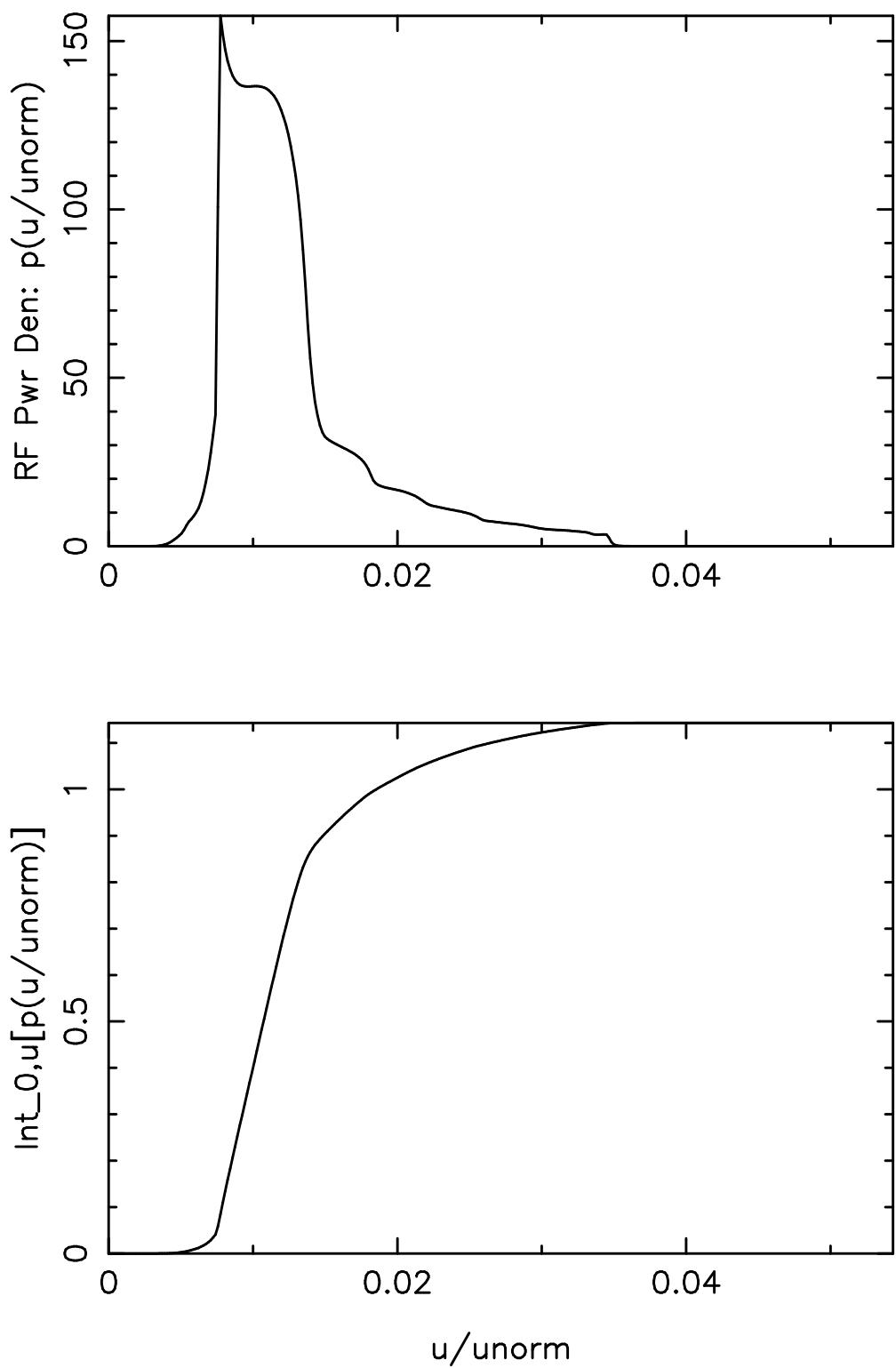


Electric field = 0.0000E+00 (V/cm)  
FSA current den of species 1 = 5.6584E+01 Amps/cm\*\*2

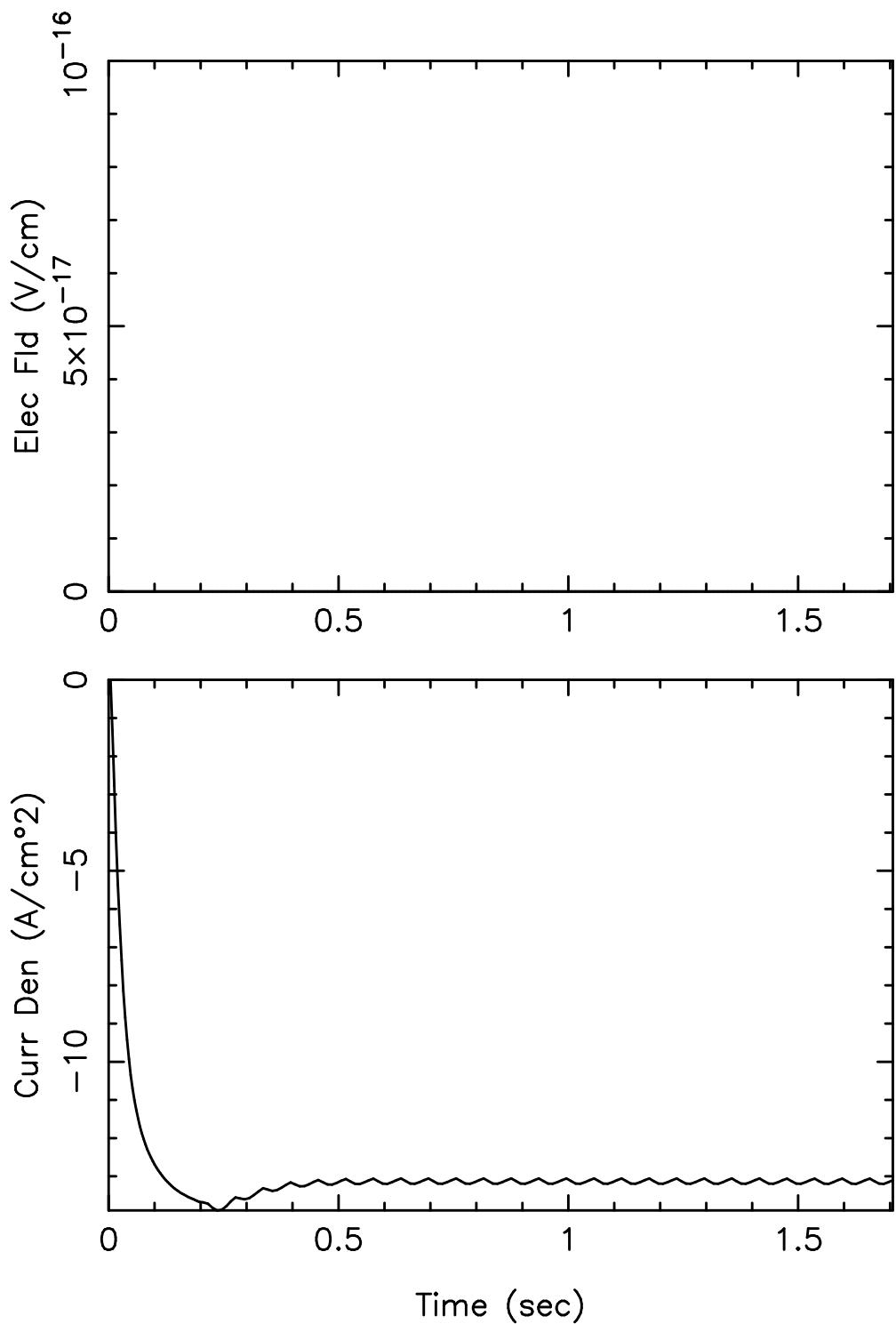
Current drive efficiency  $j/(2\pi R \cdot prf)$  = 4.4434E-02 A/W



Species: 1 Current = $0.5658E+02$  Amps/cm $^2$

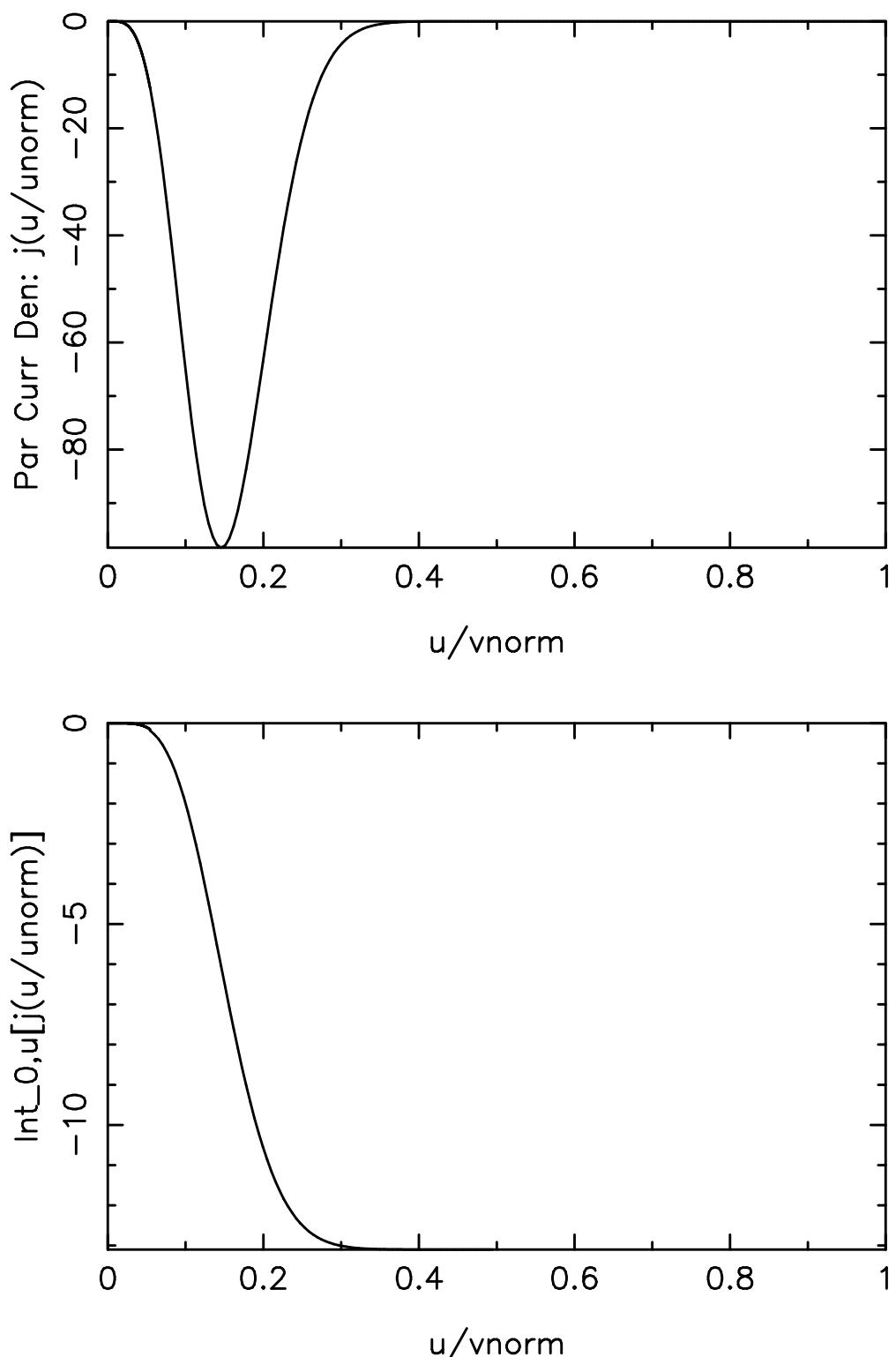


Species: 1 Power =0.1143E+01 Watts/cc

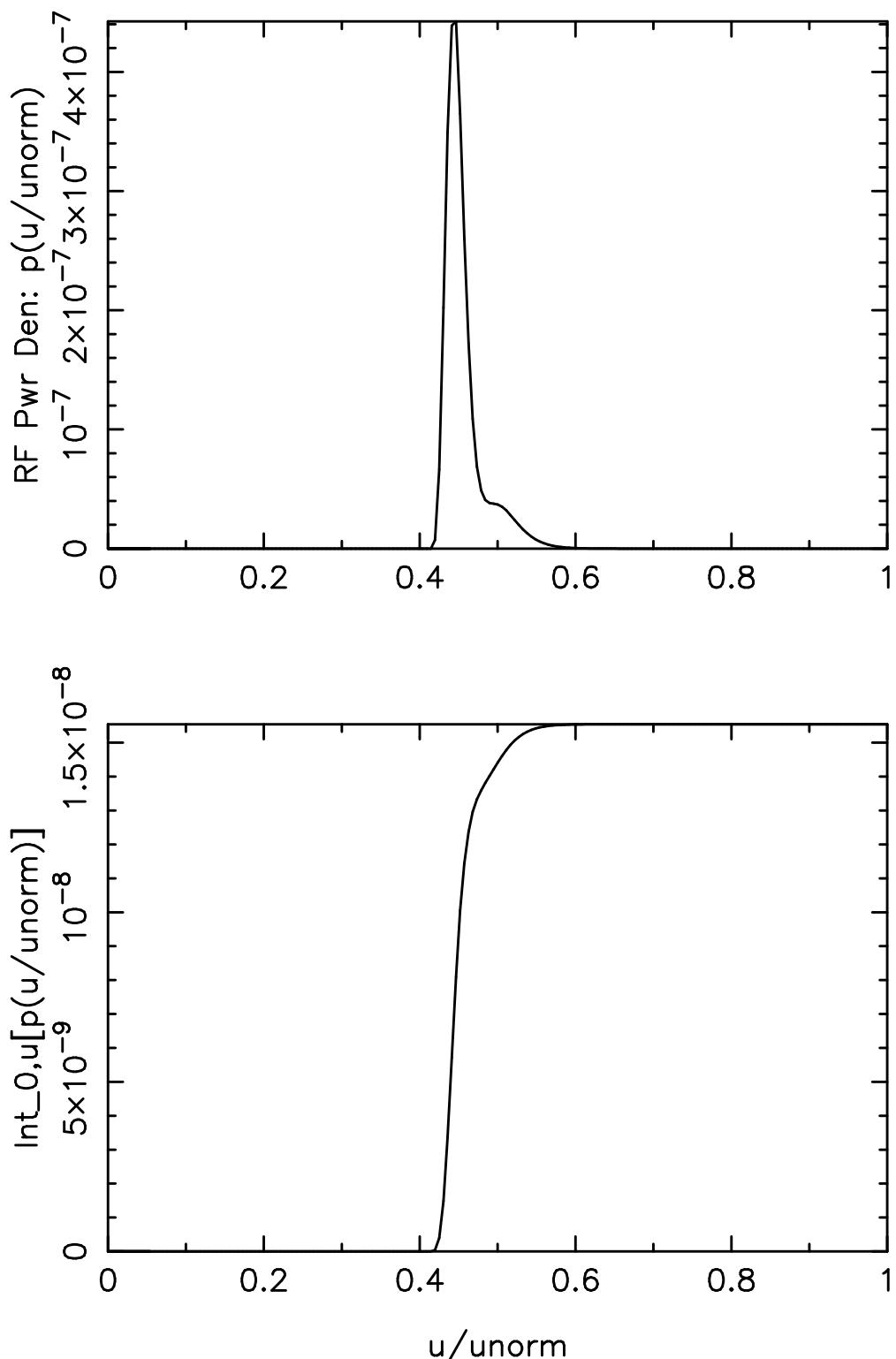


Electric field = 0.0000E+00 (V/cm)  
 FSA current den of species 2 = -1.3101E+01 Amps/cm\*\*2

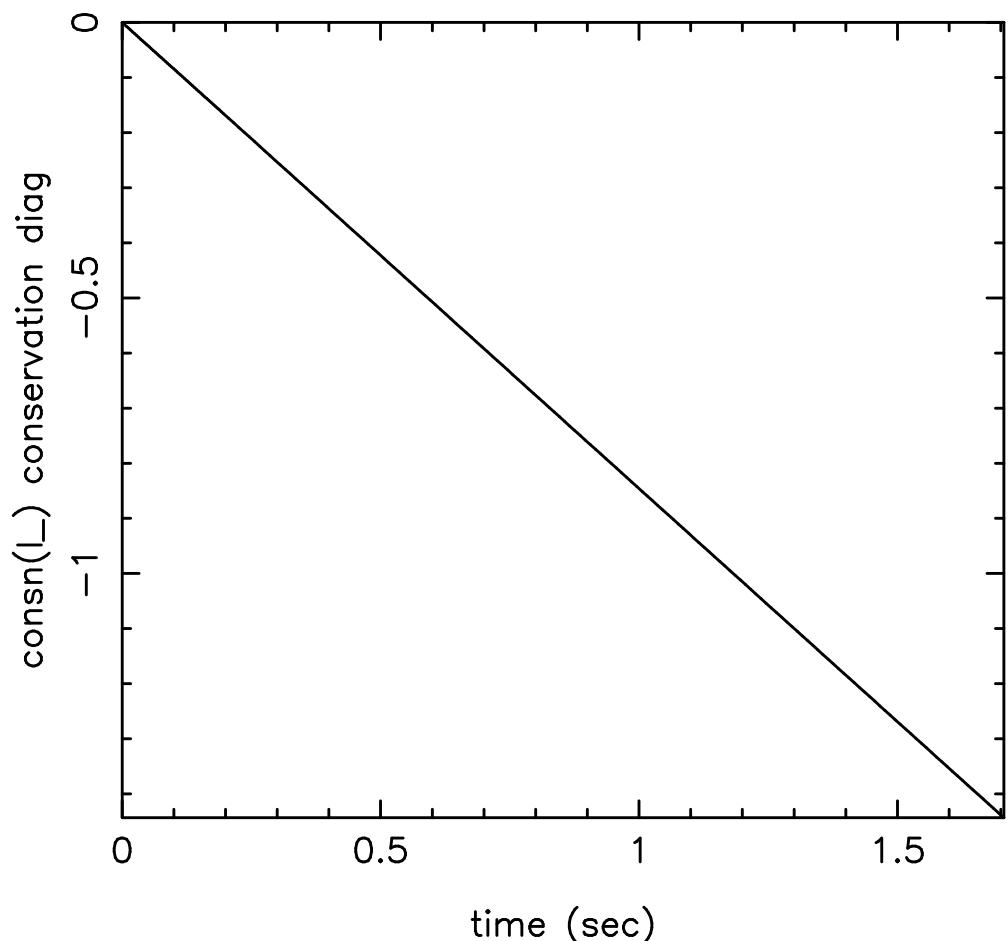
Current drive efficiency  $j/(2\pi R \cdot \text{prf}) = -7.5655E+05$  A/W  
 Electron current (units  $ne \cdot q \cdot v_{th}(\text{kelec}, \text{lr}_\perp)$ ) =  $-4.9532E-04$   
 power (units:  $ne \cdot v_{th}(\text{kelec}, \text{lr}_\perp)^2 \cdot me \cdot \nu_0$ ) =  $4.8937E-12$   
 efficiency ( $j/p$ ) (Fisch 1978 units) =  $-1.0122E+08$   
 efficiency ( $j/p$ ) ( $e/(m \cdot c \cdot \nu_c)$  units) =  $-8.6951E+05$   
 $v_{th}(\text{kelec}, \text{lr}_\perp) = \sqrt{T/m} = 2.7786E+09$  cm/sec  
 $\nu_0 = 7.5946E+04$  Hz



Species: 2 Current =-.1310E+02 Amps/cm<sup>2</sup>



Species: 2 Power =0.1554E-07 Watts/cc

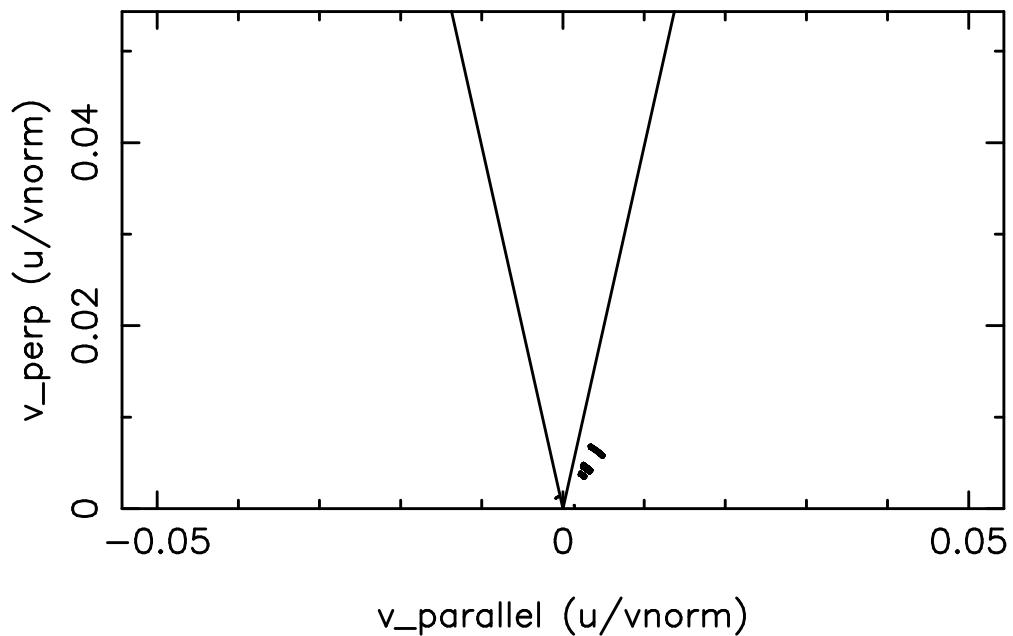


consn(L<sub>\_</sub>) = -1.4434E+00

Perfect conservation should yield machine accuracy,  
or about 1.e-14:

time step (n) is 200      time= 1.7060E+00 secs  
r/a= 8.2593E-02      radial position (R) = 1.8308E+02 cm

Species 1 Source Function (units: dist. f/sec)



time step n= 200      time= 1.71E+00 secs  
 $r/a = 8.259E-02$       radial position ( $R$ )= 1.8308E+02 cm  
 $rya = 8.259E-02$        $R=rpcon = 1.8308E+02$  cm, Surf# 5

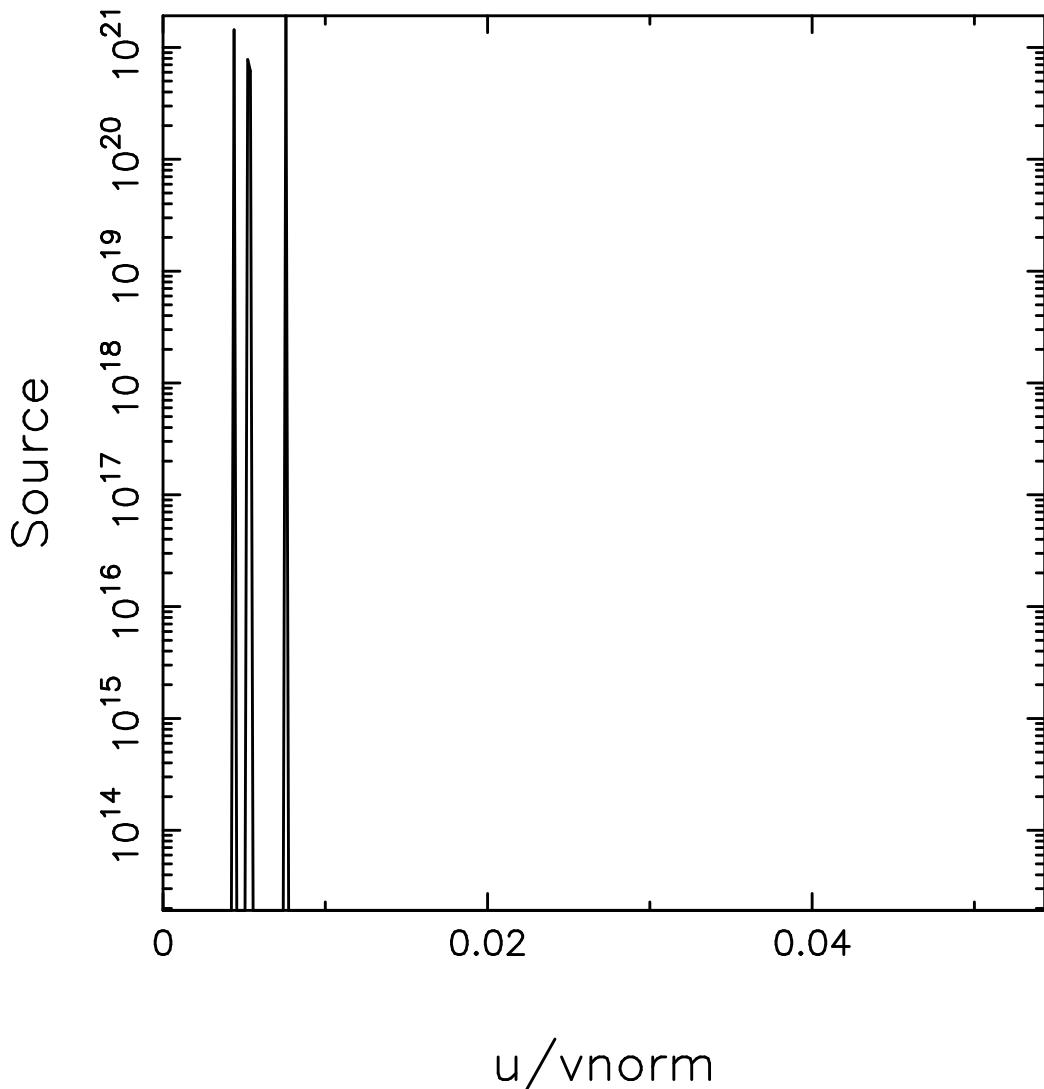
Particle source rate= 1.0069E+14 ptcls/cc/sec

Total source power [entr(..5..)]= 1.0308E+00 W/cc

Contour values:

1.9264E+10	7.6691E+10	3.0531E+11	1.2155E+12
4.8389E+12	1.9264E+13	7.6691E+13	3.0531E+14
1.2155E+15	4.8389E+15	1.9264E+16	7.6691E+16
3.0531E+17	1.2155E+18	4.8389E+18	1.9264E+19
7.6691E+19	3.0531E+20	1.2155E+21	4.8389E+21

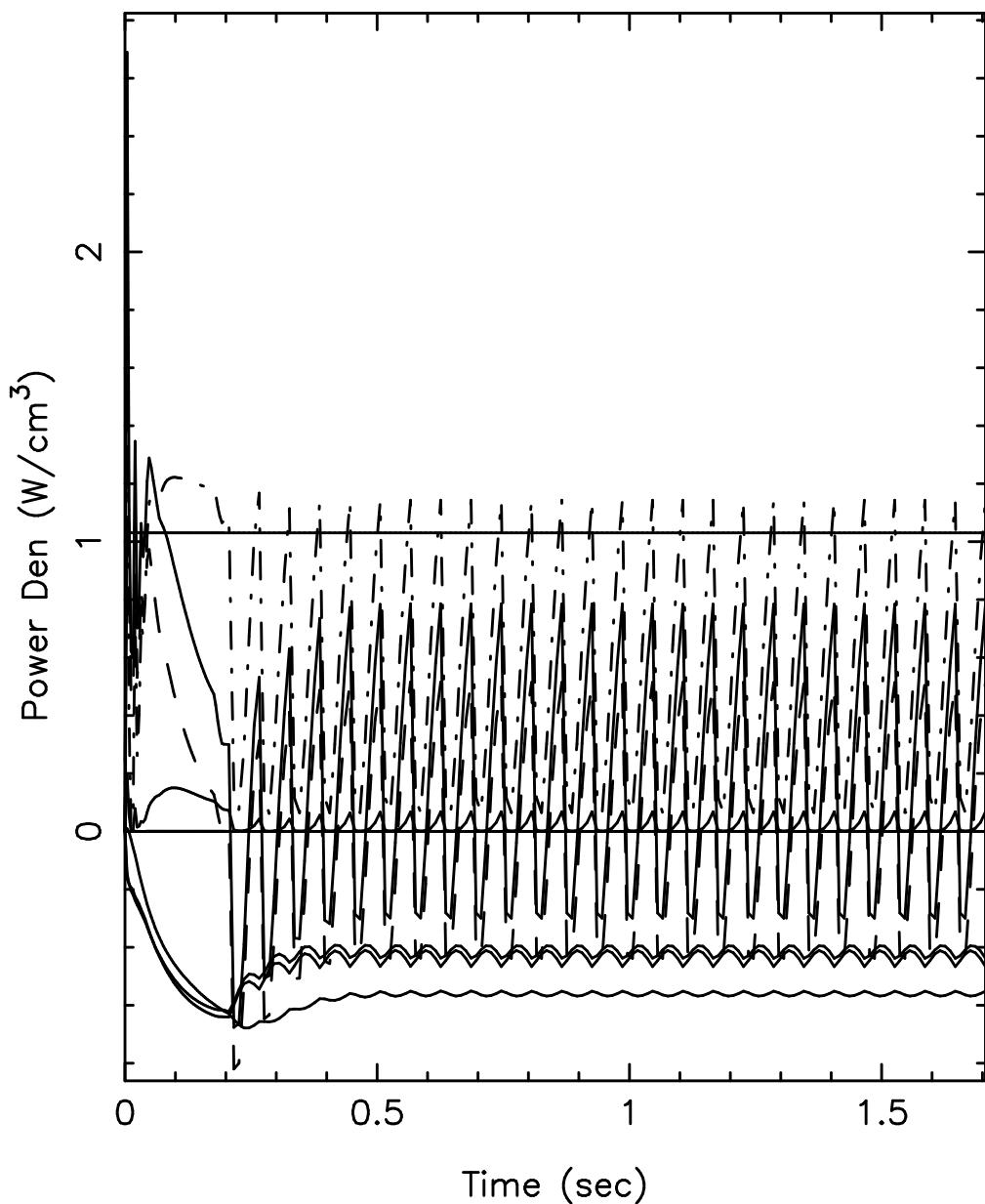
## Pitch Angle Avg Source vs. u



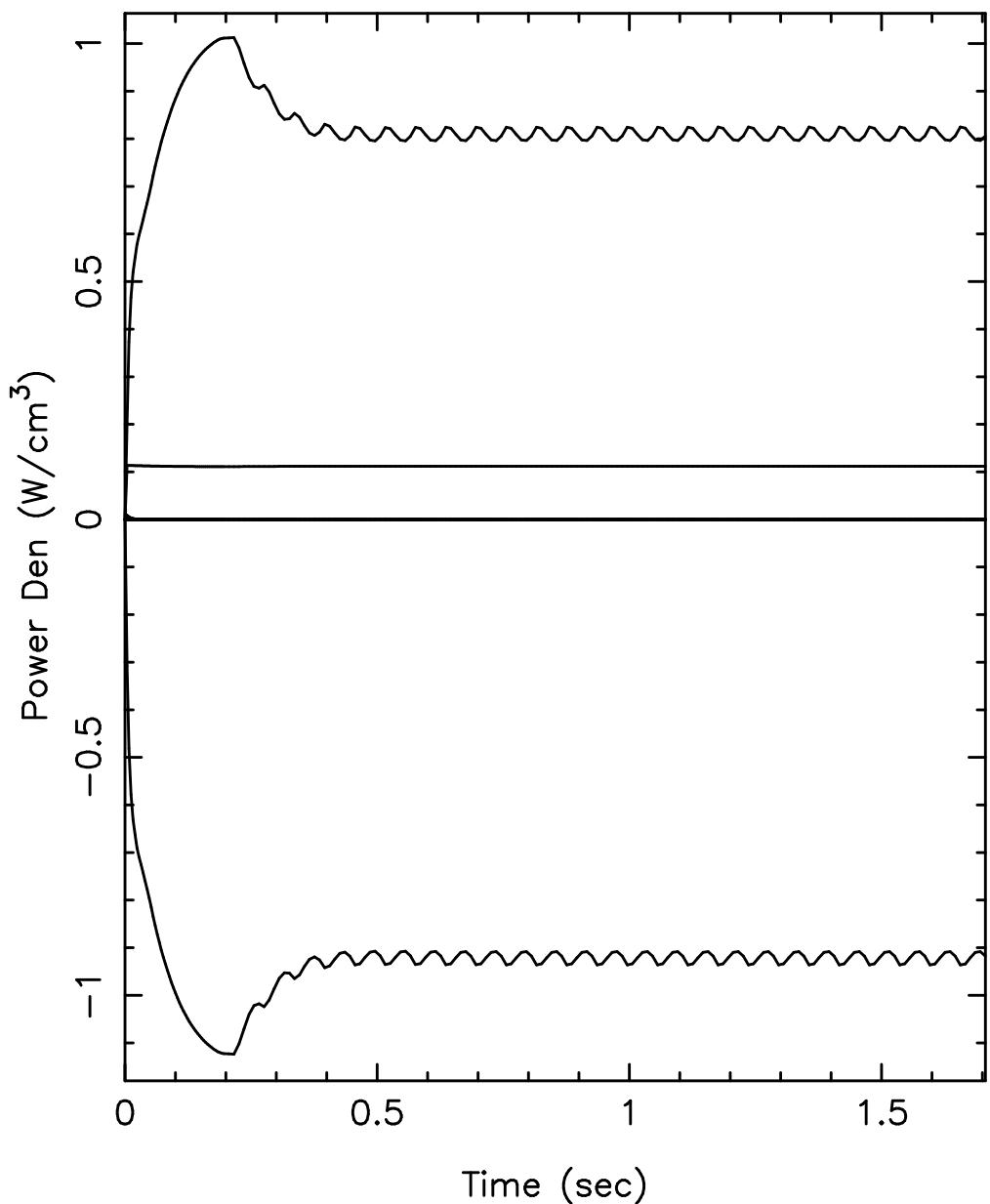
$u/vnorm$

Particle source integrated over theta0 for species 1  
(normed so int(0,1)\*2pi\*x\*\*2\*dx=mid-plane source)  
vnorm= 3.6947E+10 cm/s

time step (n) is 200 time= 1.7060E+00 secs  
r/a= 8.2593E-02 radial position (R) = 1.8308E+02 cm

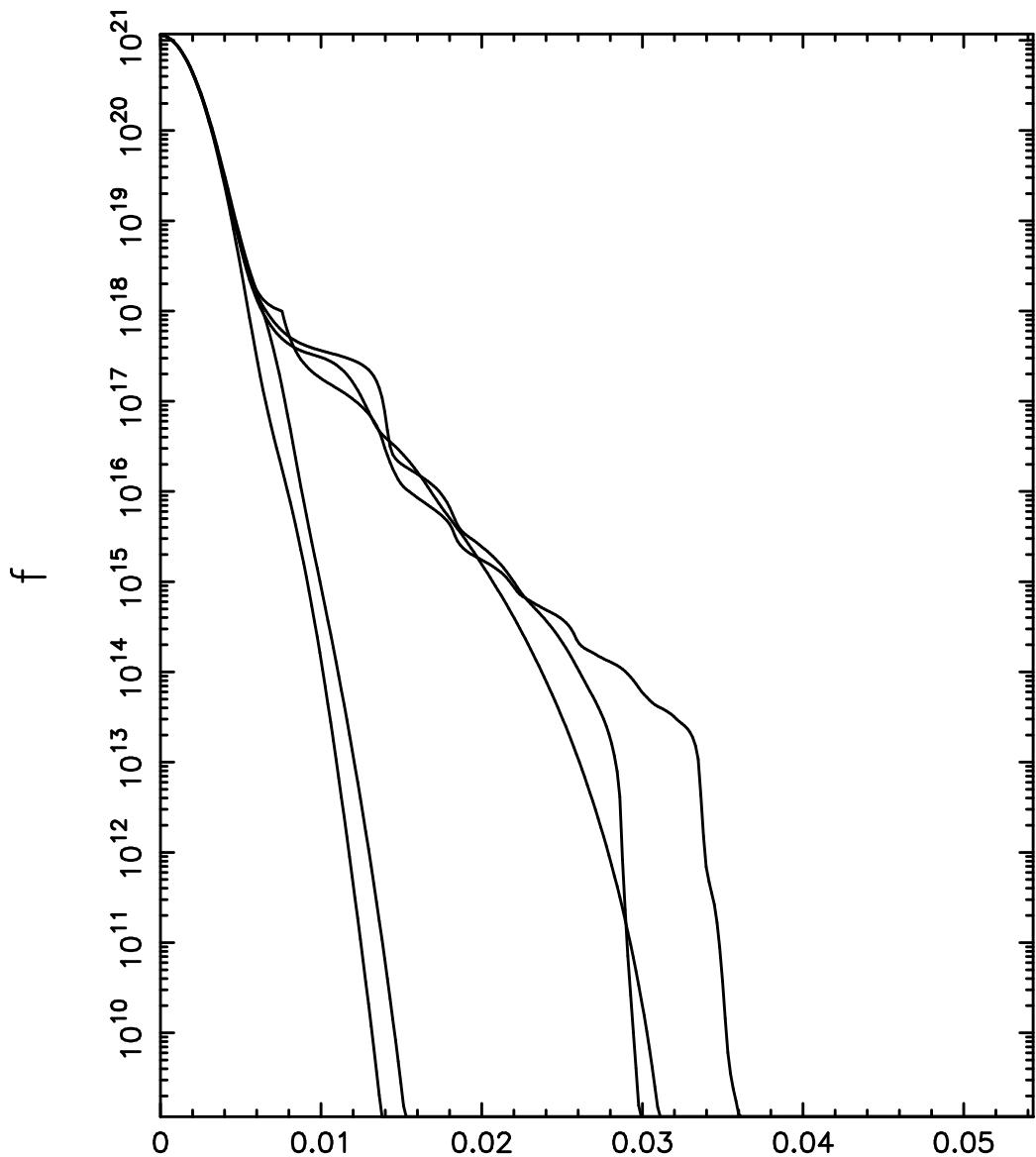


Species k= 1      Final powers in Watts/cc are:  
 sum over all comp= 7.84E-01      From df/dt : 5.14E-01  
 collisional transfer from Maxwellian elec.= -4.67E-01  
 collisional transfer from Maxwellian ions= -5.52E-01  
 collisional transfer from gens.= -4.38E-01  
 ohmic drive= 0.00E+00  
 RF drive= 1.14E+00  
 particle sources= 1.03E+00  
 loss-lossmode(k)= 6.75E-02      losses-torloss(k)= -1.48E-91  
 losses due to runaway= 0.00E+00  
 setting neg f to zero= 1.13E-04  
 synchrotron rad losses= 0.00E+00  
 phenomenological energy losses= 0.00E+00



Species k= 2      Final powers in Watts/cc are:  
sum over all comp= 8.66E-05      From df/dt : 8.66E-05  
collisional transfer from Maxwellian elec.= -9.18E-01  
collisional transfer from Maxwellian ions= 1.12E-01  
collisional transfer from gens.= 8.06E-01  
ohmic drive= 0.00E+00  
RF drive= 1.55E-08  
particle sources= 0.00E+00  
loss-lossmode(k)= 0.00E+00      losses-torloss(k)= -6.35E-92  
losses due to runaway= 0.00E+00  
setting neg f to zero= 0.00E+00  
synchrotron rad losses= 0.00E+00  
phenomenological energy losses= 0.00E+00

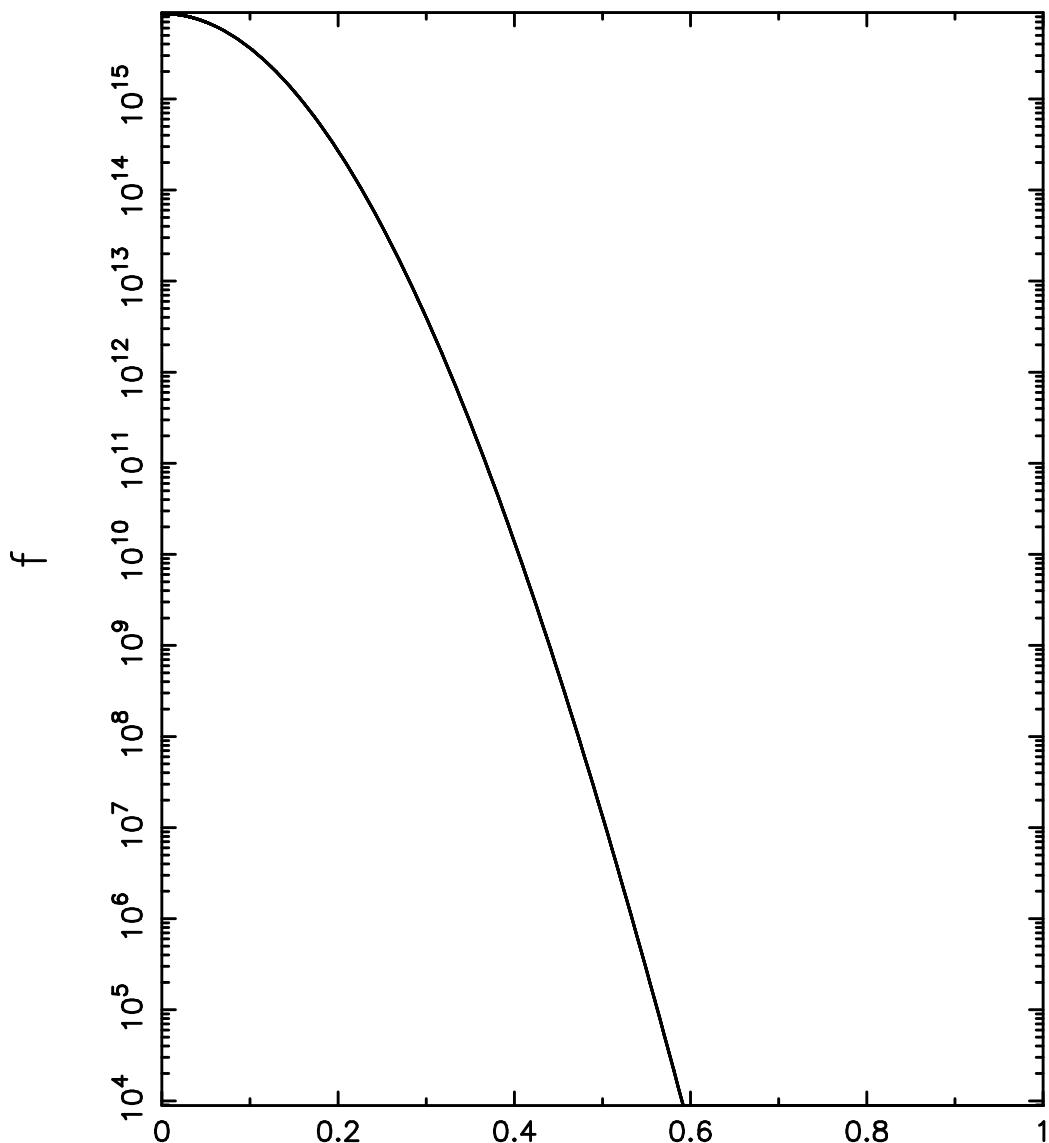
## Cuts of f vs. v, at cnst pitch angle



$u/v_{\text{norm}}$

Distribution function vs. velocity for some angles  
Species number=1, enorm= 3.00D+02  
time step (n)= 200 time= 0.170600E+01 secs  
r/a= 8.26E-02 radial position(R)= 1.831E+02 cm

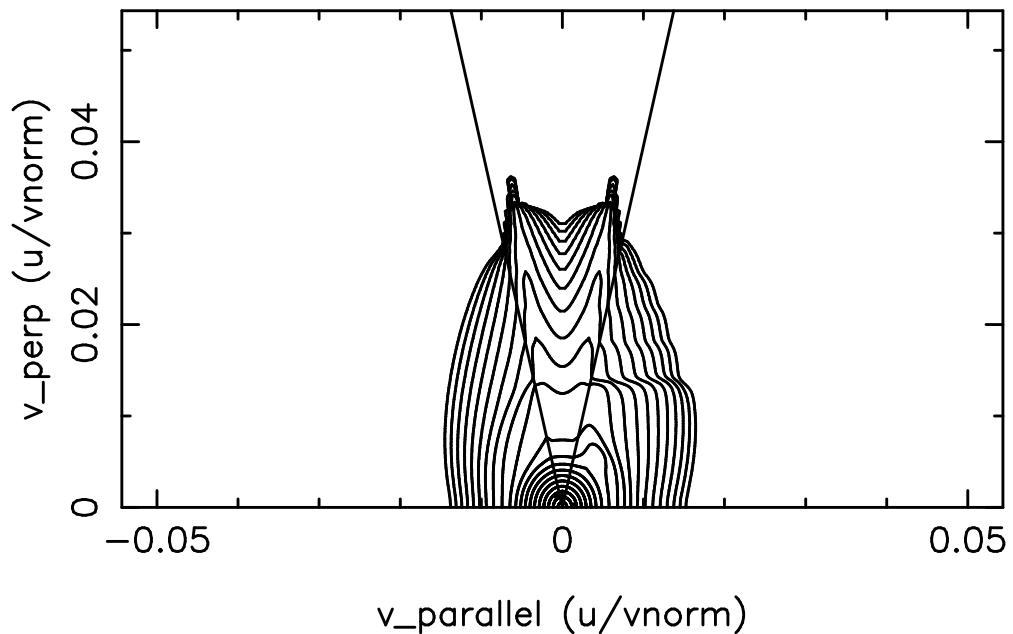
## Cuts of f vs. v, at cnst pitch angle



$u/v_{\text{norm}}$

Distribution function vs. velocity for some angles  
Species number=2, enorm= 3.00D+02  
time step (n)= 200 time= 0.170600E+01 secs  
r/a= 8.26E-02 radial position(R)= 1.831E+02 cm

### Species 1 Distribution Function Contour Plot

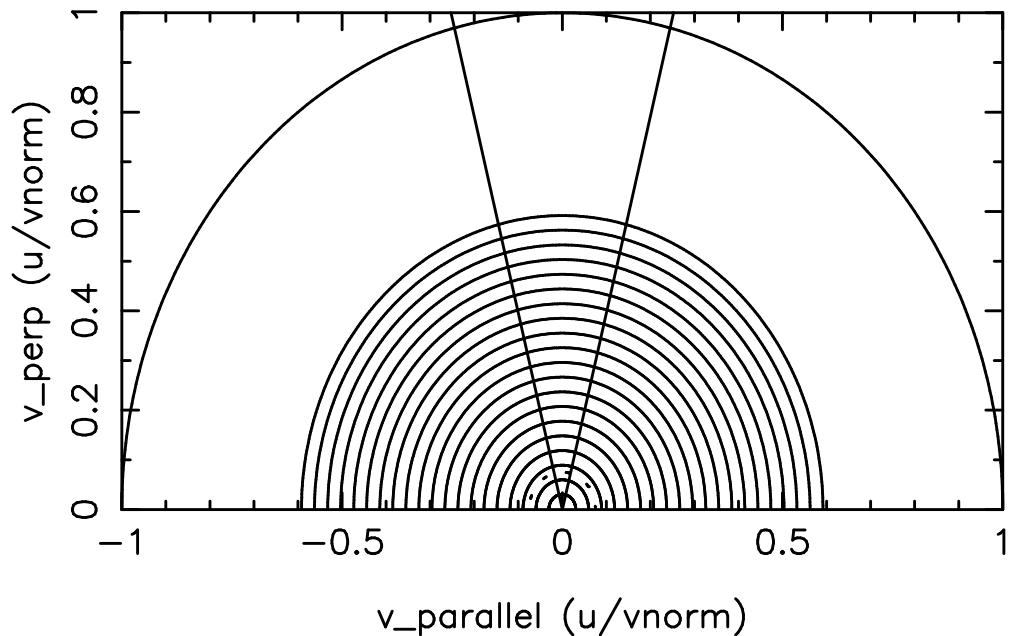


time step n= 200      time= 1.71E+00 secs  
 $r/a = 8.259E-02$       radial position (R)= 1.8308E+02 cm  
 $rya = 8.259E-02$       R=rpcon= 1.8308E+02 cm, Surf# 5

Contour values:

1.053327E+21	8.290093E+20	5.569912E+20	3.201515E+20
1.578855E+20	6.704608E+19	2.461955E+19	7.854496E+18
2.188391E+18	5.353954E+17	1.156748E+17	2.219959E+16
3.806657E+15	5.866471E+14	8.172434E+13	1.034946E+13
1.197990E+12	1.274232E+11	1.251694E+10	1.141024E+09

### Species 2 Distribution Function Contour Plot



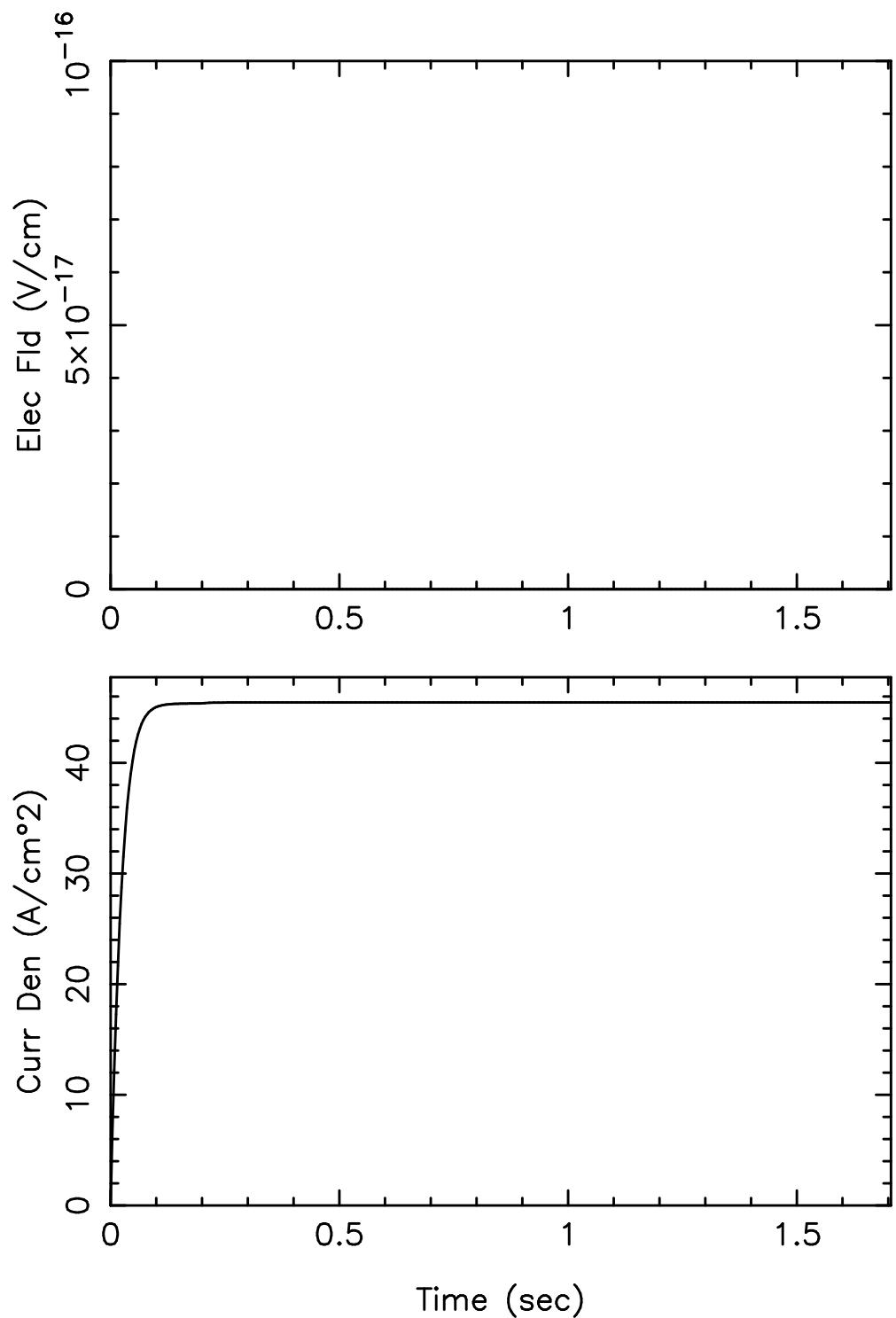
time step n= 200      time= 1.71E+00 secs  
 $r/a = 8.259E-02$       radial position (R)= 1.8308E+02 cm  
 $rya = 8.259E-02$       R=rpcon= 1.8308E+02 cm, Surf# 5

Contour values:

8.001449E+15	6.348248E+15	4.320866E+15	2.526810E+15
1.272201E+15	5.528958E+14	2.080488E+14	6.801967E+13
1.939646E+13	4.844323E+12	1.064332E+12	2.066554E+11
3.562794E+10	5.480150E+09	7.556996E+08	9.387582E+07
1.055549E+07	1.079348E+06	1.008313E+05	8.644063E+03

## LOCAL RADIAL QUANTITIES

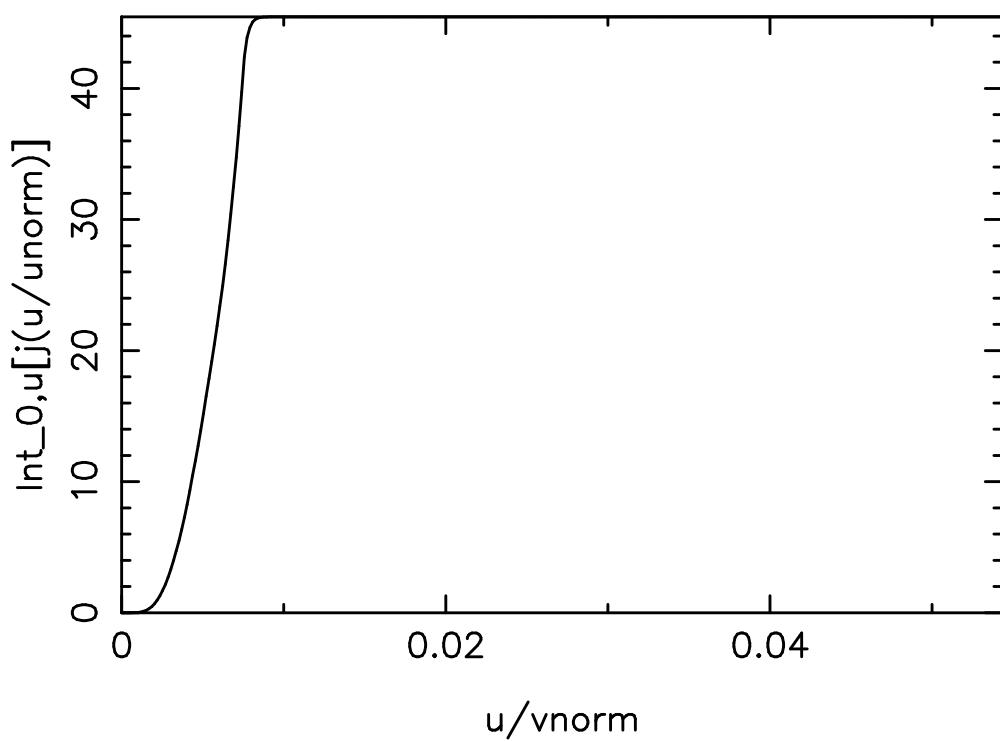
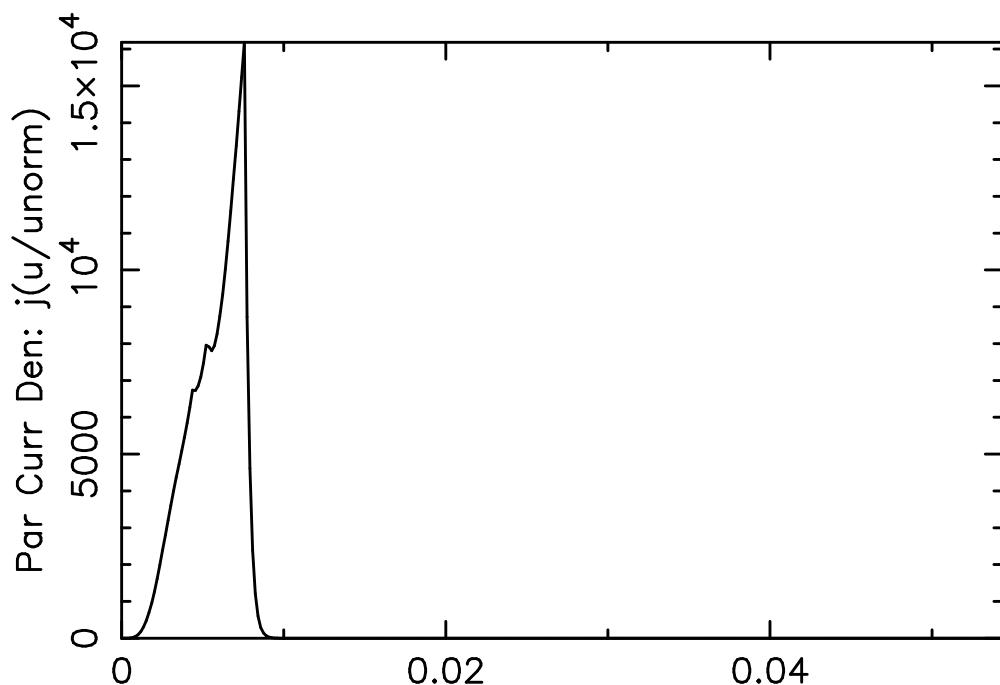
```
time step n= 200,      time= 1.7060E+00 secs
flux surf= 7      total flux surfs= 55
r/a= 1.189E-01      radial position (R)= 1.8531E+02 cms
rya= 1.189E-01      R=rpcon= 1.853E+02 cm
    enormi, enorme(=enorm) (kev) = 3250.000      300.000
vnorm/c = 1.2324136
vthe (sqrt(te/me))/c = 0.0921028
vthe/vnorm = 0.0747337
k= 1 vth(k)/vnorm = 0.0014244
k= 2 vth(k)/vnorm = 0.0747337
k= 3 vth(k)/vnorm = 0.0014244
k= 4 vth(k)/vnorm = 0.0001423
k= 5 vth(k)/vnorm = 0.0747337
```



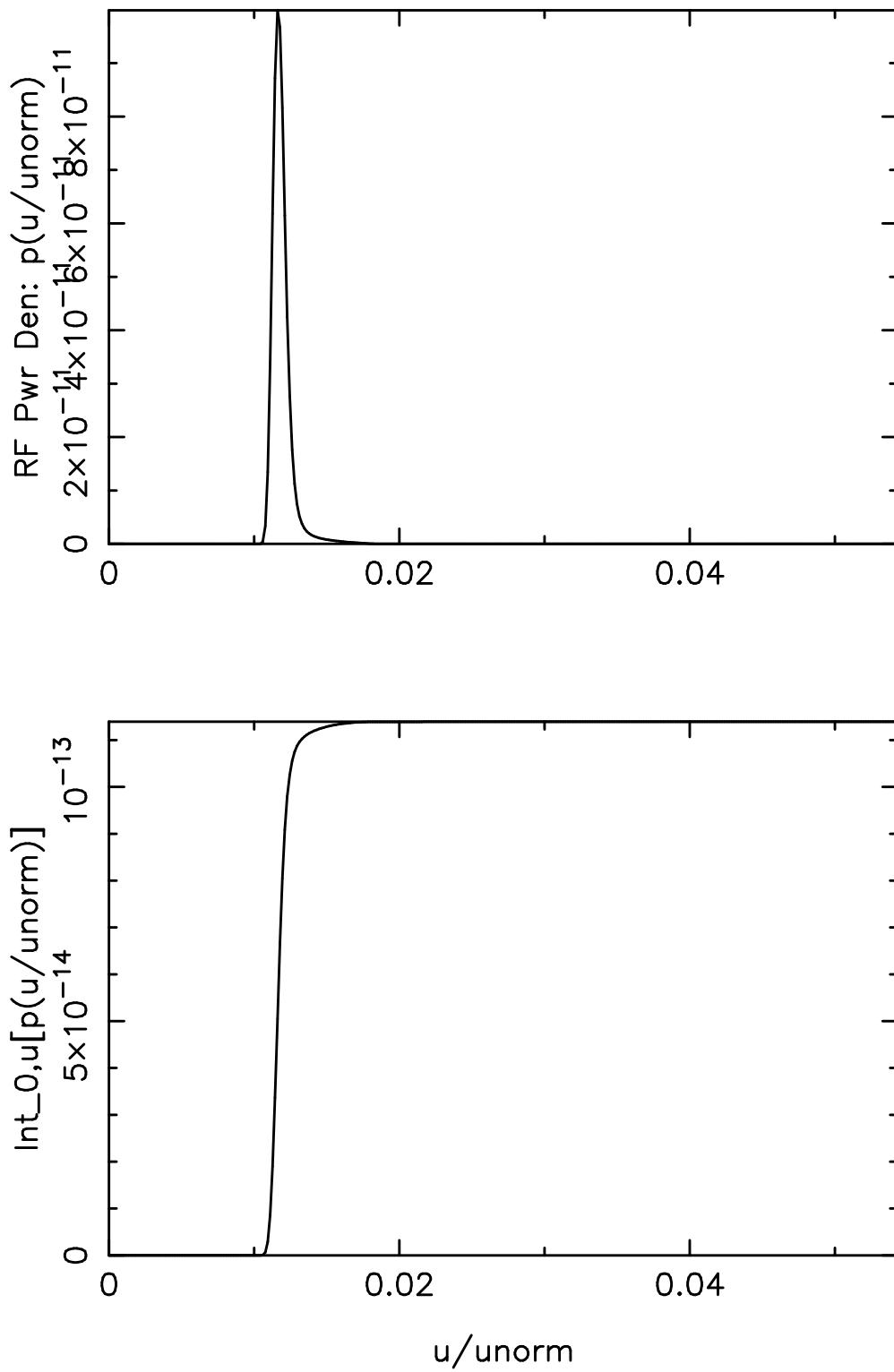
Electric field = 0.0000E+00 (V/cm)

FSA current den of species 1 = 4.5462E+01 Amps/cm\*\*2

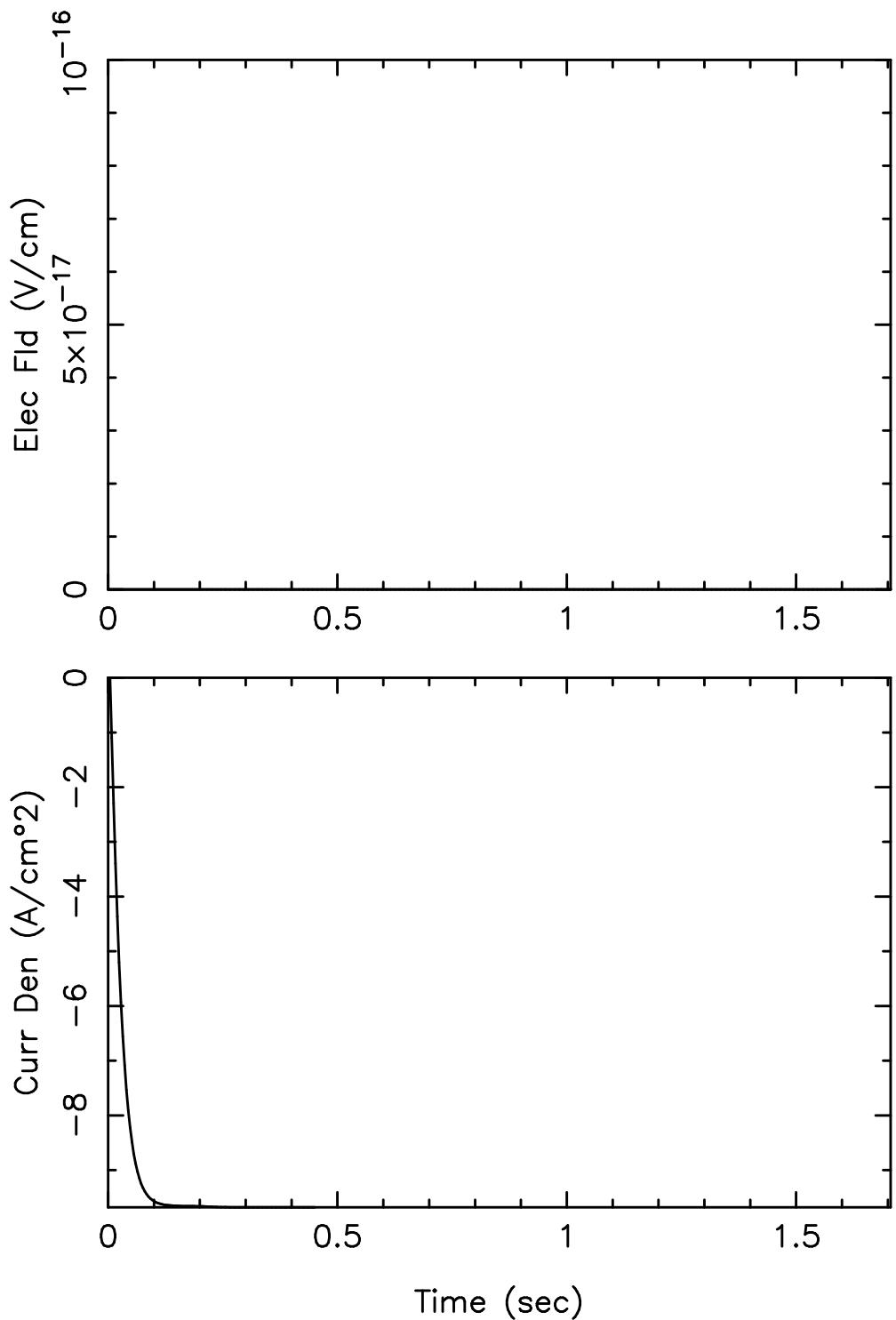
Current drive efficiency  $j/(2\pi R \rho r_f)$  = 3.5902E+11 A/W



Species: 1 Current =  $0.4546E+02$  Amps/cm $^2$

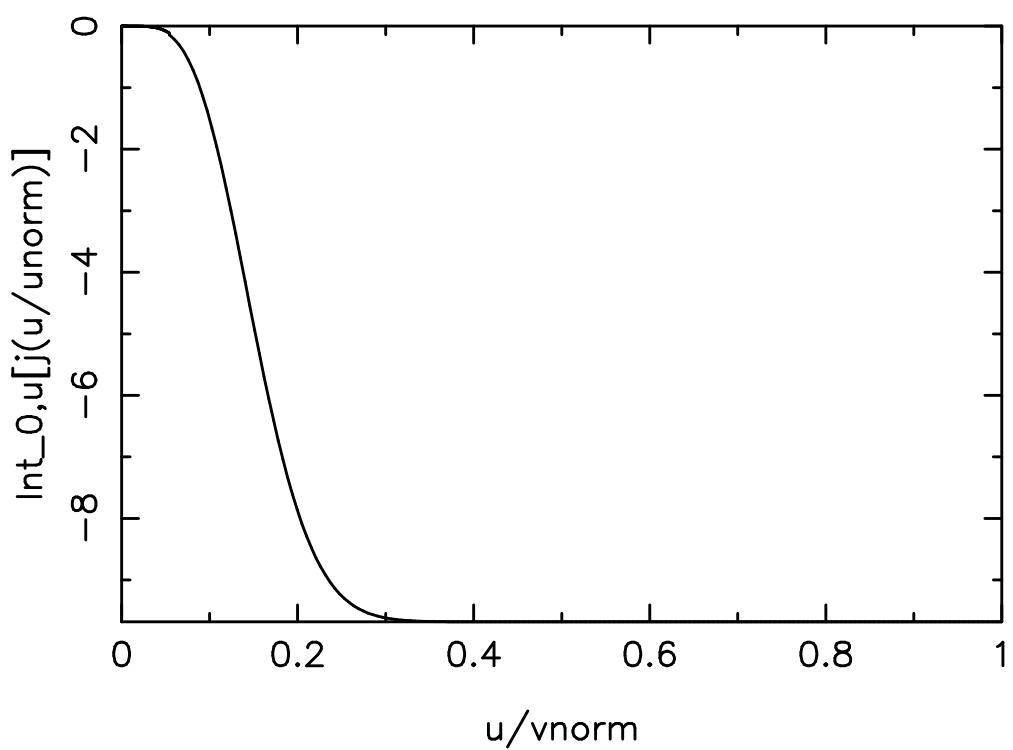
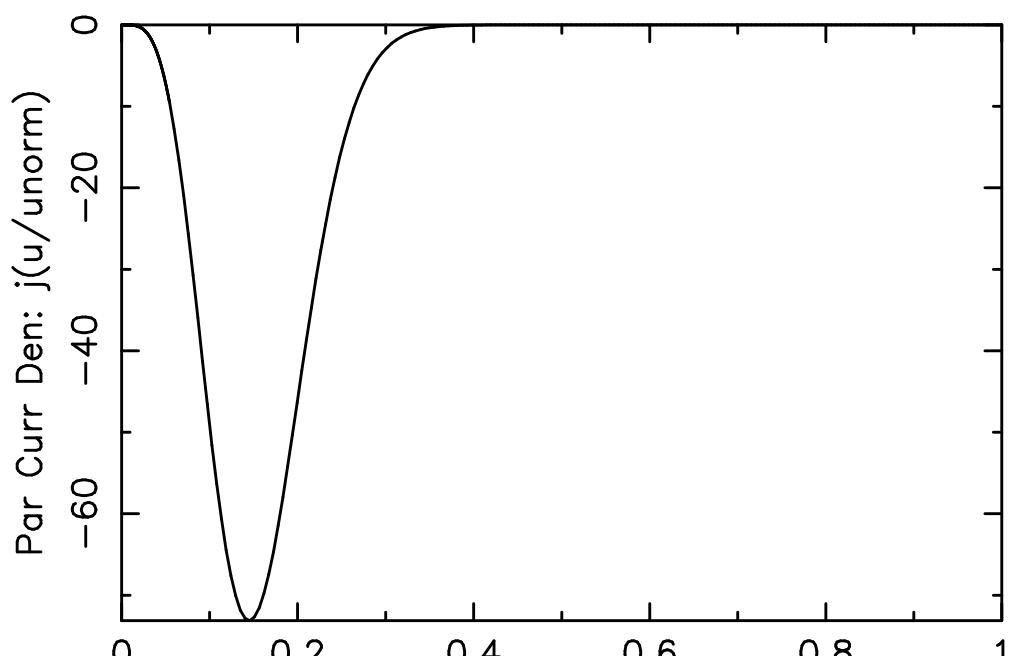


Species: 1 Power = $0.1139\text{E}-12$  Watts/cc

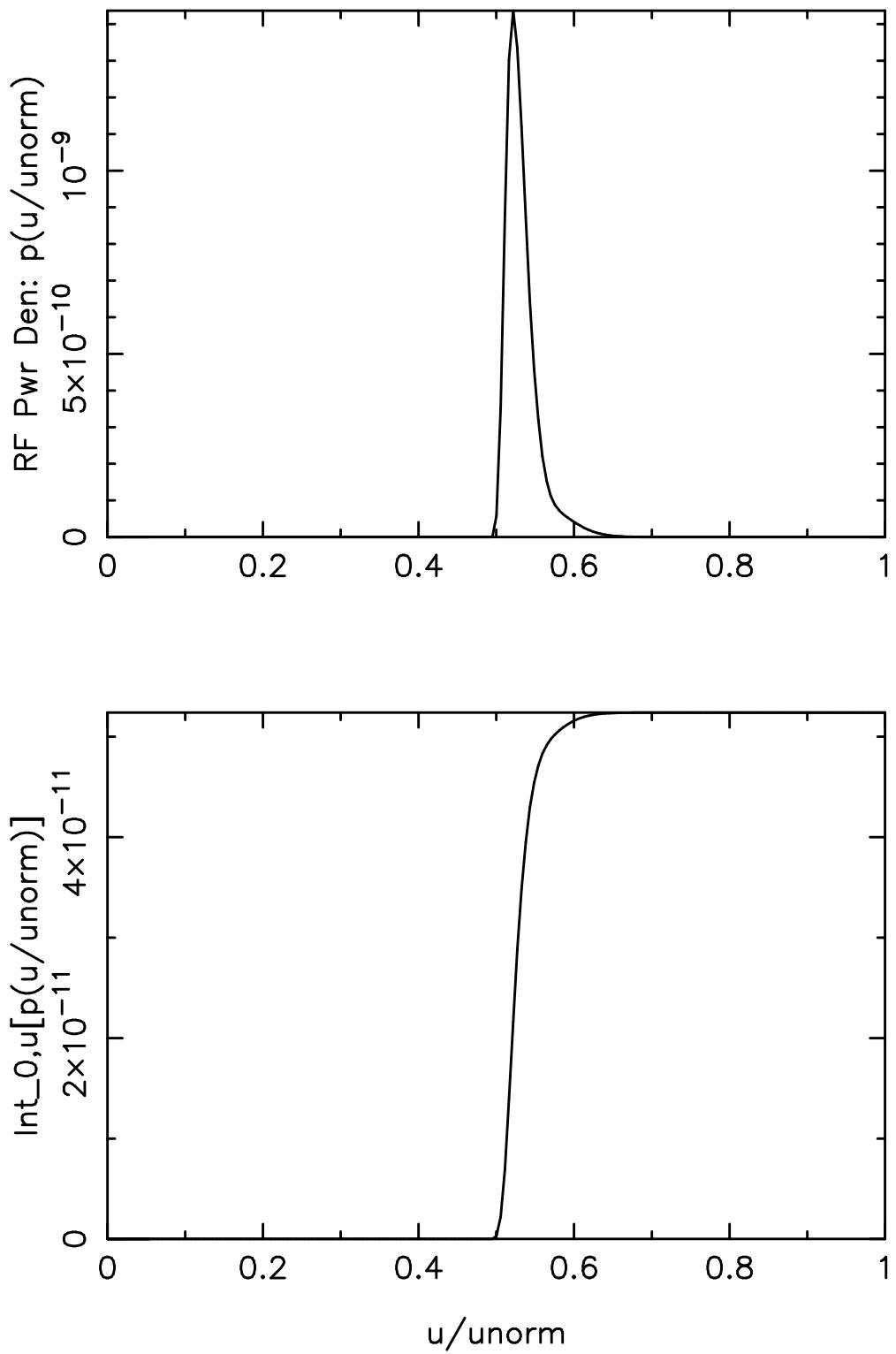


Electric field = 0.0000E+00 (V/cm)  
 FSA current den of species 2 = -9.6799E+00 Amps/cm\*\*2

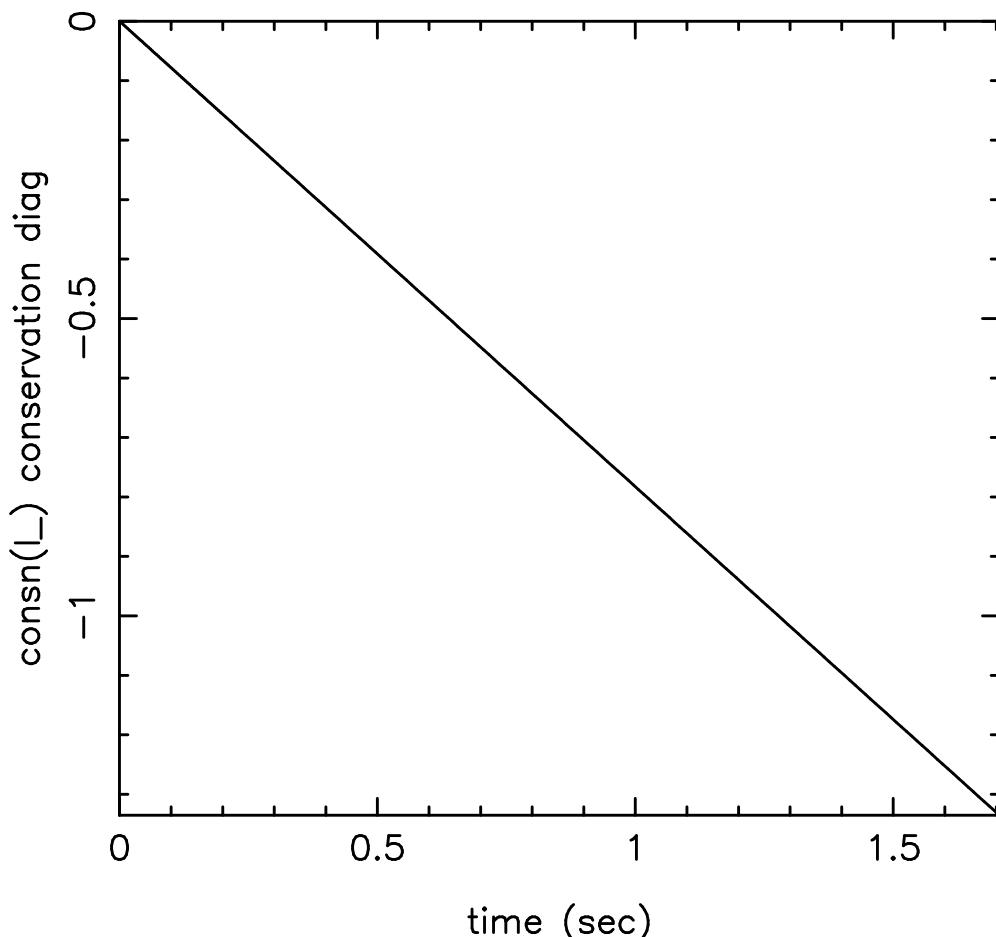
Current drive efficiency  $j/(2\pi R \cdot prf)$  = -1.6617E+08 A/W  
 Electron current (units  $ne \cdot q \cdot v_{th}(kelec, lr_*)$ ) = -3.7180E-04  
 power (units:  $ne \cdot v_{th}(kelec, lr_*)^{**} 2 \cdot me \cdot nu_0$ ) = 1.6710E-14  
 efficiency ( $j/p$ ) (Fisch 1978 units) = -2.2250E+10  
 efficiency ( $j/p$ ) ( $e/(m \cdot c \cdot nu_c$  units) = -1.8874E+08  
 $v_{th}(kelec, lr_*) = \sqrt{T/m}$  = 2.7612E+09 cm/sec  
 $nu_0 = 7.6666E+04$  Hz



Species: 2 Current =-.9680E+01 Amps/cm<sup>2</sup>



Species: 2 Power =0.5241E-10 Watts/cc

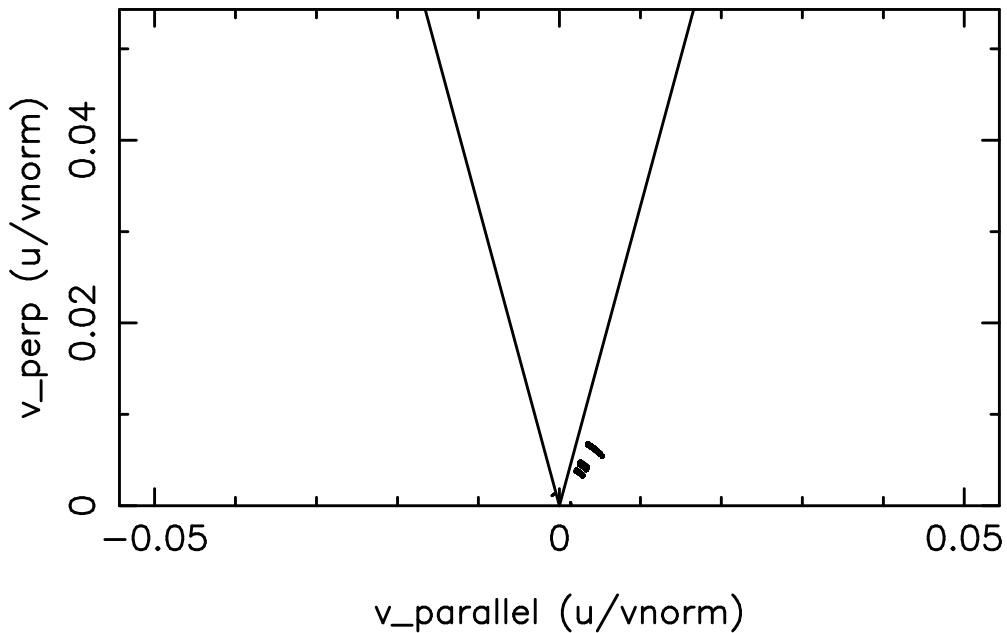


consn(l\_)= -1.3353E+00

Perfect conservation should yield machine accuracy,  
or about 1.e-14:

time step (n) is 200      time= 1.7060E+00 secs  
r/a= 1.1889E-01      radial position (R) = 1.8531E+02 cm

Species 1 Source Function (units: dist. f/sec)



time step n= 200      time= 1.71E+00 secs  
 $r/a = 1.189E-01$       radial position ( $R$ )= 1.8531E+02 cm  
 $rya = 1.189E-01$        $R=rpcon = 1.8531E+02$  cm, Surf# 7

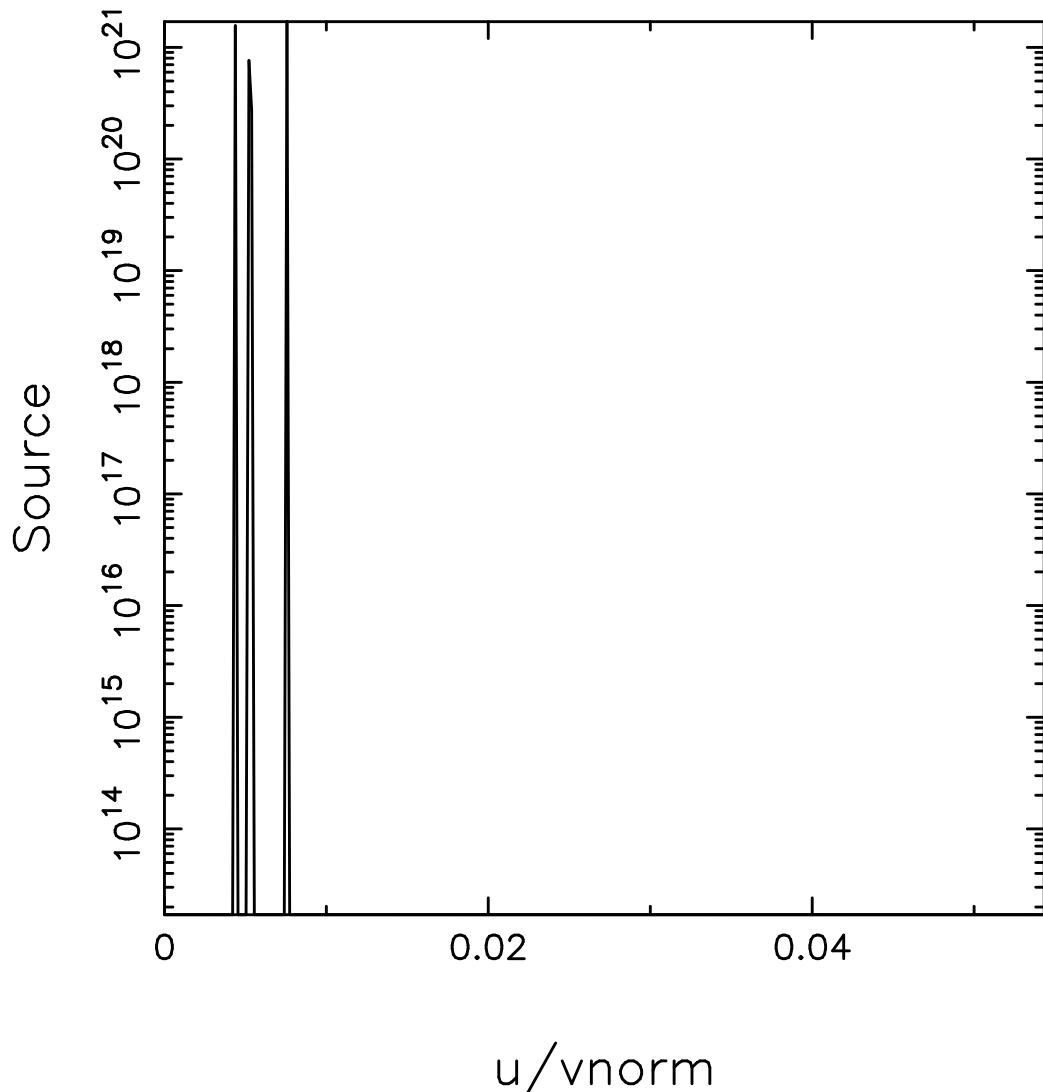
Particle source rate= 9.2171E+13 ptcls/cc/sec

Total source power [entr(..5..)]= 9.3592E-01 W/cc

Contour values:

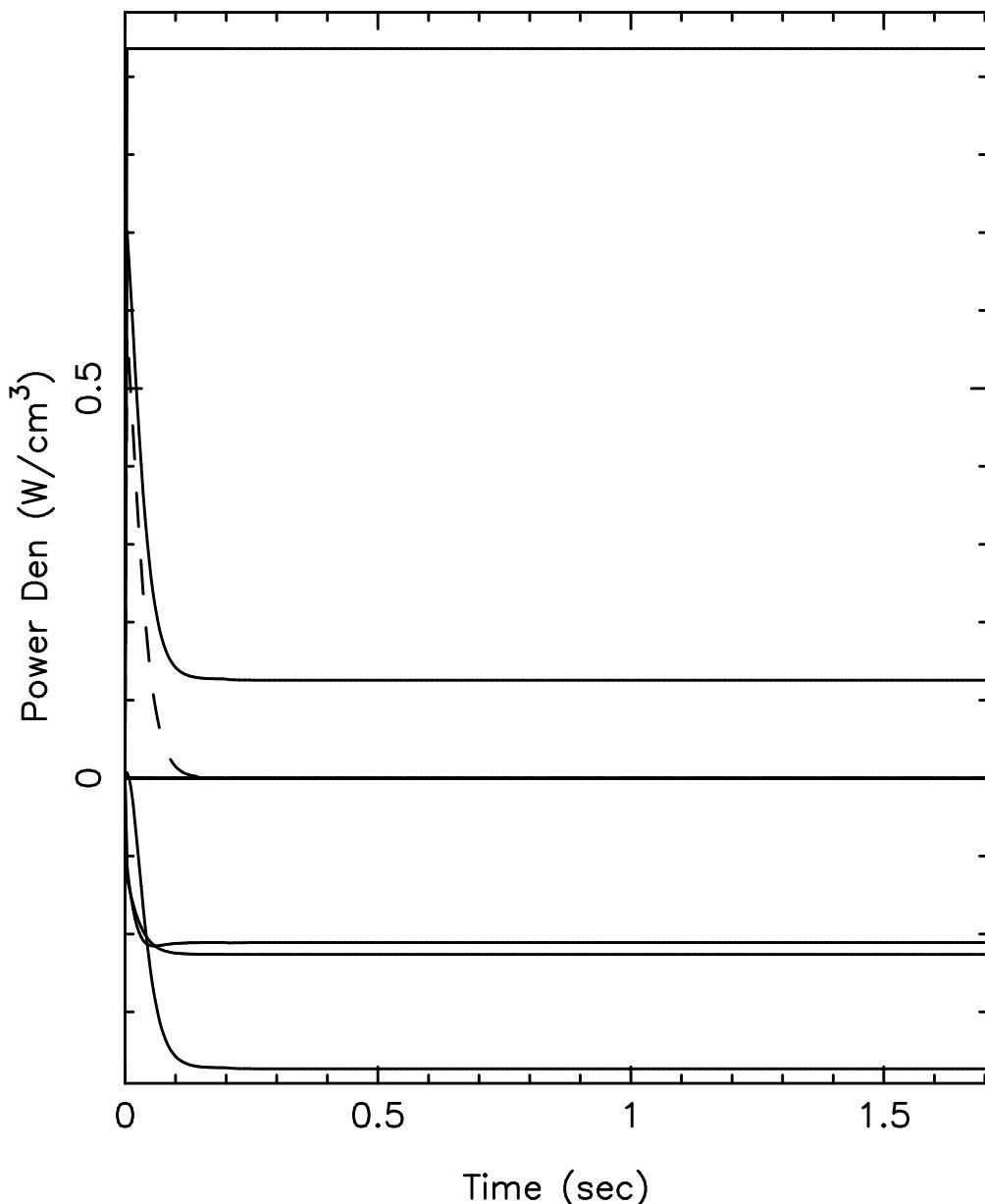
1.6251E+10	6.4697E+10	2.5756E+11	1.0254E+12
4.0821E+12	1.6251E+13	6.4697E+13	2.5756E+14
1.0254E+15	4.0821E+15	1.6251E+16	6.4697E+16
2.5756E+17	1.0254E+18	4.0821E+18	1.6251E+19
6.4697E+19	2.5756E+20	1.0254E+21	4.0821E+21

## Pitch Angle Avg Source vs. u

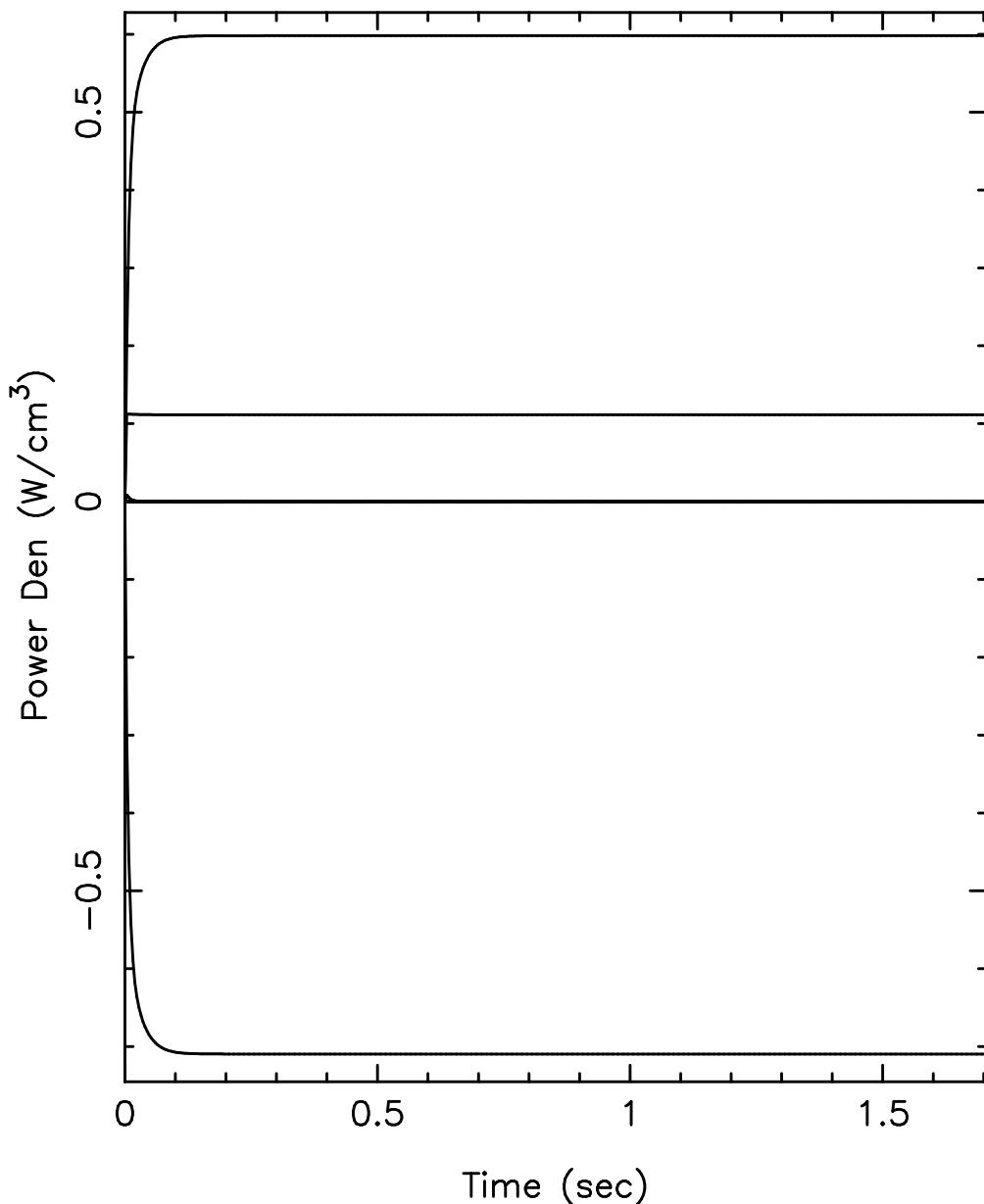


Particle source integrated over theta0 for species 1  
(normed so int(0,1)\*2pi\*x\*\*2\*dx=mid-plane source)  
vnorm= 3.6947E+10 cm/s

time step (n) is 200 time= 1.7060E+00 secs  
r/a= 1.1889E-01 radial position (R) = 1.8531E+02 cm

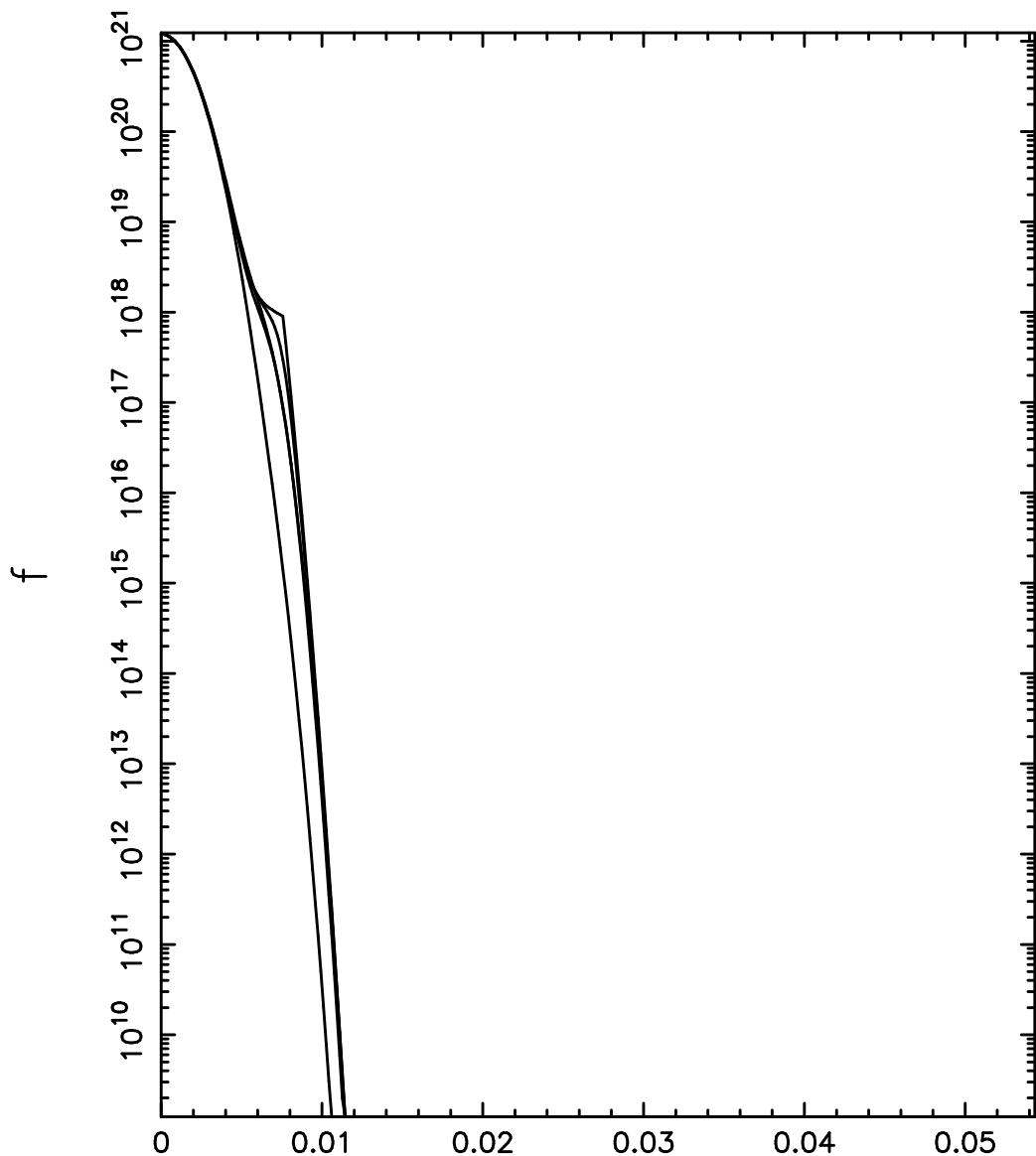


Species k= 1      Final powers in Watts/cc are:  
sum over all comp= 1.26E-01      From df/dt : -7.61E-12  
collisional transfer from Maxwellian elec.= -2.26E-01  
collisional transfer from Maxwellian ions= -3.73E-01  
collisional transfer from gens.= -2.11E-01  
ohmic drive= 0.00E+00  
RF drive= 1.14E-13  
particle sources= 9.36E-01  
loss-lossmode(k)= 1.41E-33      losses-torloss(k)= -1.01E-91  
losses due to runaway= 0.00E+00  
setting neg f to zero= 1.06E-17  
synchrotron rad losses= 0.00E+00  
phenomenological energy losses= 0.00E+00



Species k= 2      Final powers in Watts/cc are:  
sum over all comp= -2.96E-09    From df/dt : -6.39E-12  
collisional transfer from Maxwellian elec.= -7.10E-01  
collisional transfer from Maxwellian ions= 1.11E-01  
collisional transfer from gens.= 5.98E-01  
ohmic drive= 0.00E+00  
RF drive= 5.24E-11  
particle sources= 0.00E+00  
loss-lossmode(k)= 0.00E+00    losses-torloss(k)= -6.21E-92  
losses due to runaway= 0.00E+00  
setting neg f to zero= 0.00E+00  
synchrotron rad losses= 0.00E+00  
phenomenological energy losses= 0.00E+00

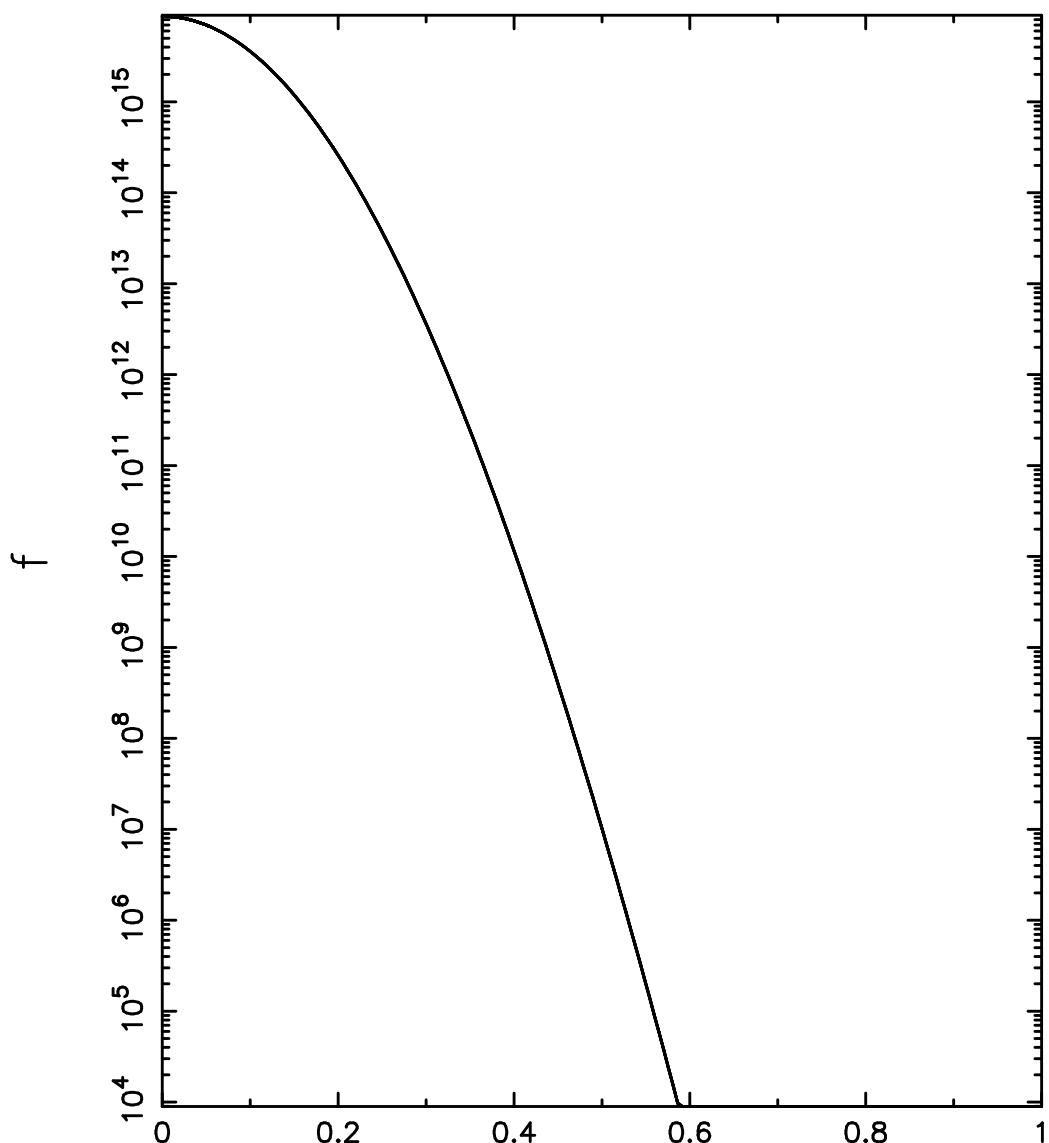
## Cuts of $f$ vs. $v$ , at cnst pitch angle



$u/v_{\text{norm}}$

Distribution function vs. velocity for some angles  
Species number=1, enorm= 3.00D+02  
time step (n)= 200 time= 0.170600E+01 secs  
 $r/a = 1.19E-01$  radial position( $R$ )= 1.853E+02 cm

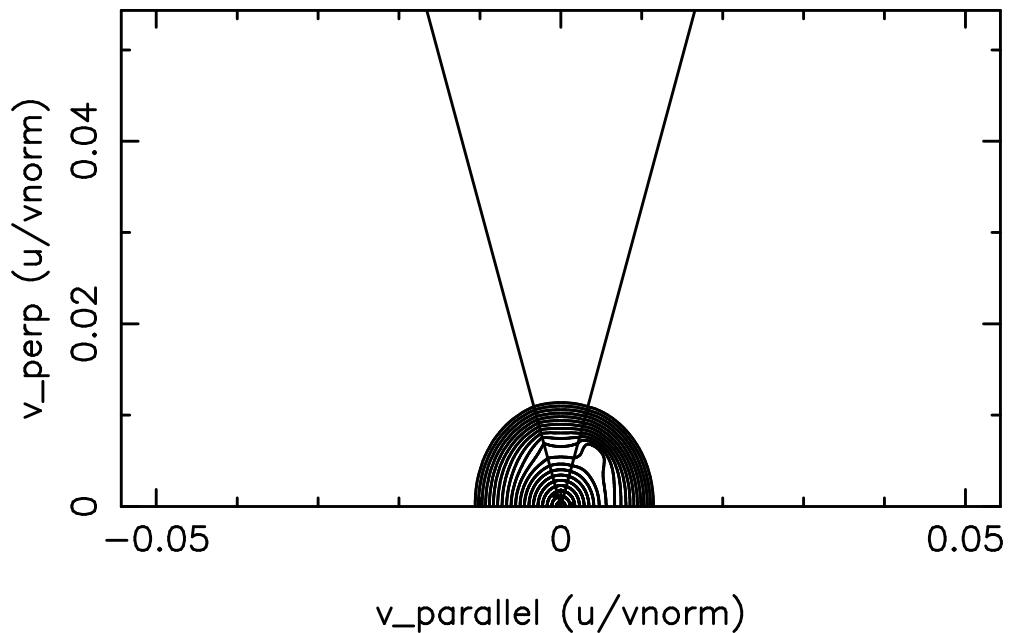
## Cuts of $f$ vs. $v$ , at cnst pitch angle



$u/v_{\text{norm}}$

Distribution function vs. velocity for some angles  
Species number=2, enorm= 3.00D+02  
time step (n)= 200 time= 0.170600E+01 secs  
r/a= 1.19E-01 radial position(R)= 1.853E+02 cm

### Species 1 Distribution Function Contour Plot

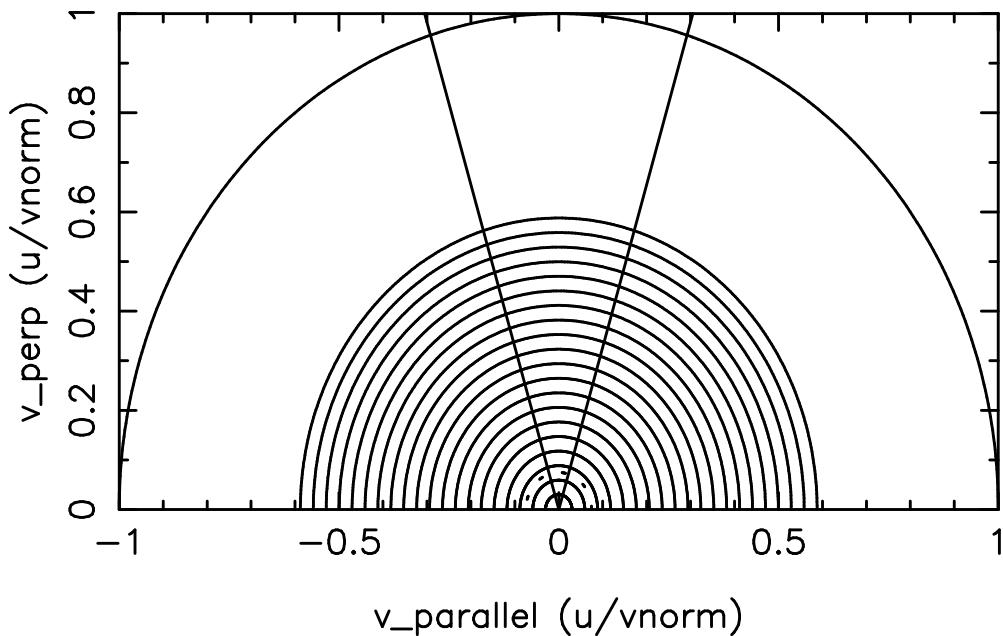


time step n= 200      time= 1.71E+00 secs  
 $r/a = 1.189E-01$       radial position (R)= 1.8531E+02 cm  
 $rya = 1.189E-01$       R=rpcon= 1.8531E+02 cm, Surf# 7

Contour values:

1.109267E+21	8.733874E+20	5.871876E+20	3.377982E+20
1.667594E+20	7.089539E+19	2.606429E+19	8.325350E+18
2.322183E+18	5.686886E+17	1.229648E+17	2.361122E+16
4.049621E+15	6.240076E+14	8.688287E+13	1.099216E+13
1.270577E+12	1.348868E+11	1.321832E+10	1.201458E+09

### Species 2 Distribution Function Contour Plot



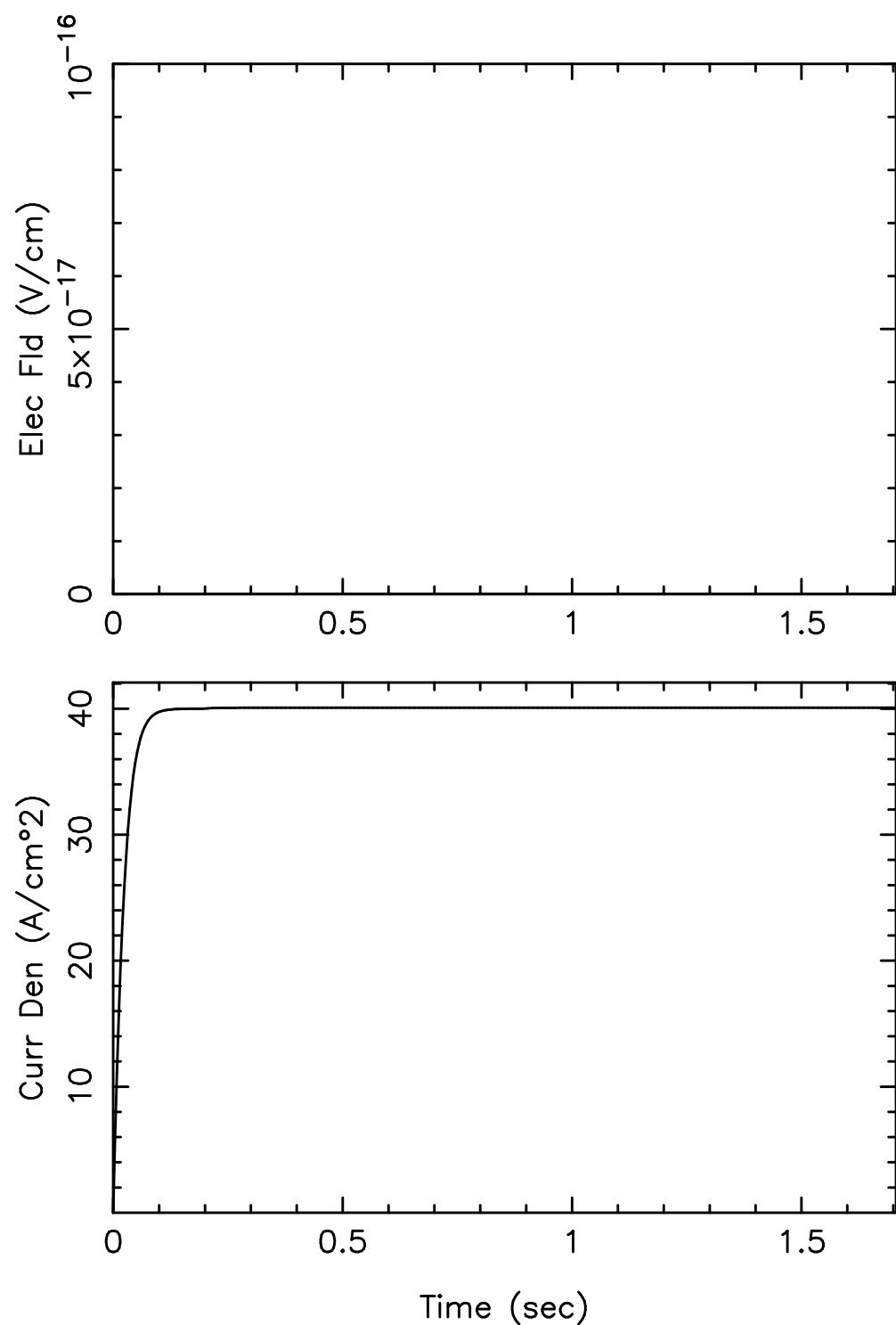
time step n= 200      time= 1.71E+00 secs  
 $r/a = 1.189E-01$       radial position (R)= 1.8531E+02 cm  
 $rya = 1.189E-01$       R=rpcon= 1.8531E+02 cm, Surf# 7

Contour values:

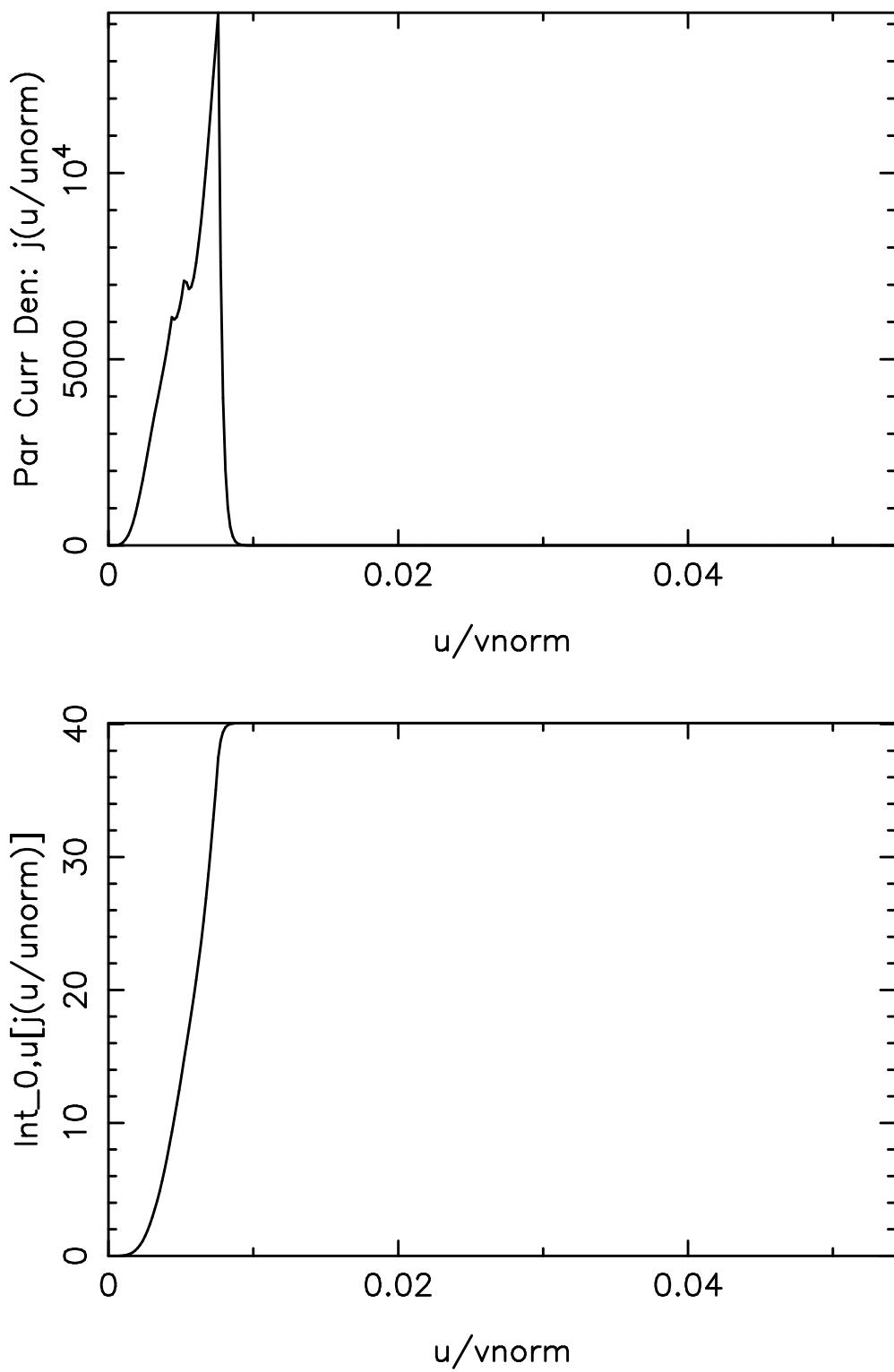
8.047190E+15	6.386468E+15	4.349003E+15	2.544923E+15
1.282328E+15	5.577893E+14	2.100871E+14	6.875107E+13
1.962278E+13	4.904840E+12	1.078353E+12	2.094787E+11
3.612348E+10	5.556153E+09	7.659023E+08	9.507442E+07
1.067833E+07	1.090230E+06	1.016460E+05	8.692590E+03

## LOCAL RADIAL QUANTITIES

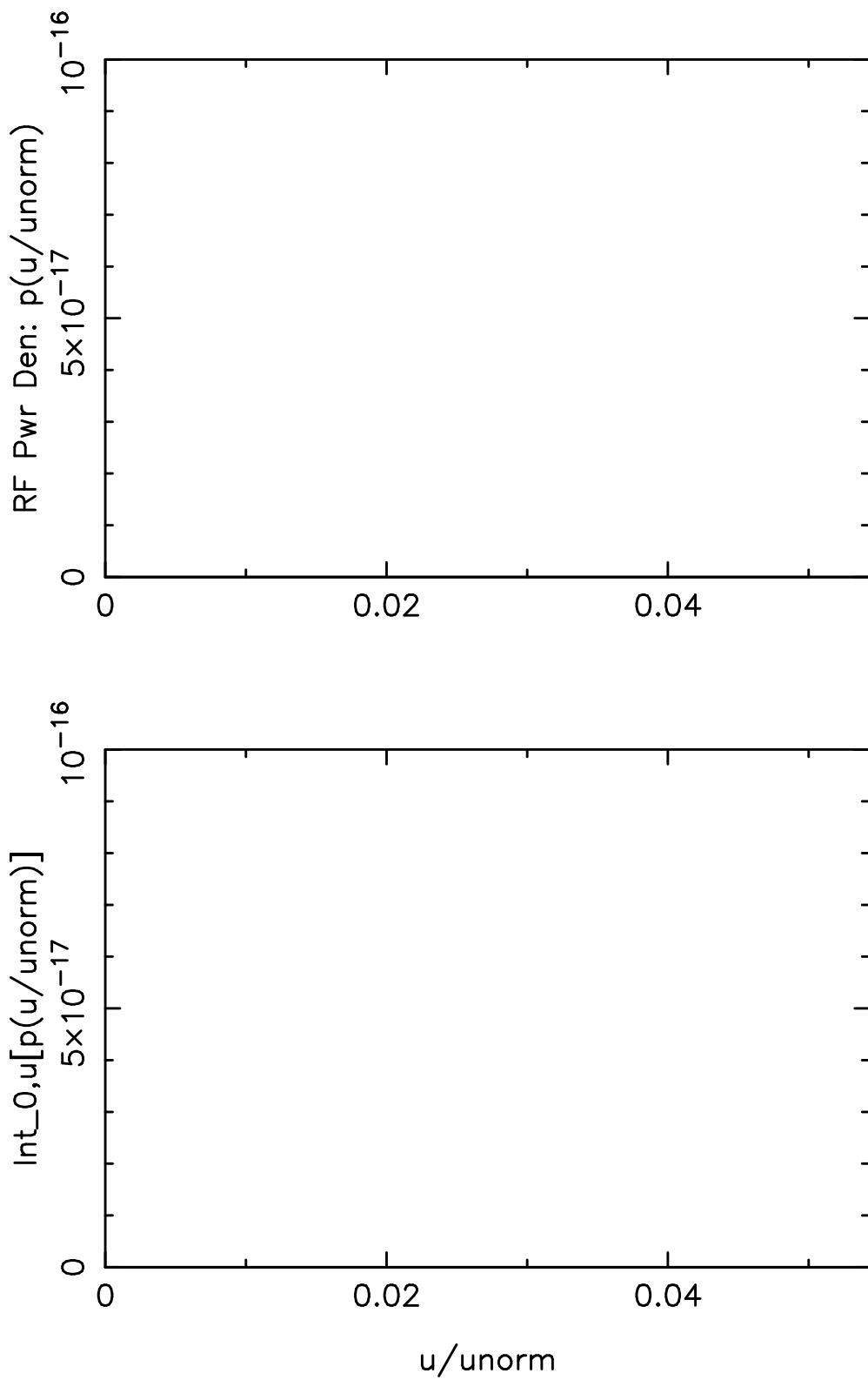
```
time step n= 200,      time= 1.7060E+00 secs
flux surf= 8      total flux surfs= 55
r/a= 1.370E-01      radial position (R)= 1.8640E+02 cms
rya= 1.370E-01      R=rpcon= 1.864E+02 cm
    enormi, enorme(=enorm) (kev) = 3250.000   300.000
vnorm/c = 1.2324136
vthe (sqrt(te/me))/c = 0.0917379
vthe/vnorm = 0.0744376
k= 1 vth(k)/vnorm = 0.0014187
k= 2 vth(k)/vnorm = 0.0744376
k= 3 vth(k)/vnorm = 0.0014187
k= 4 vth(k)/vnorm = 0.0001417
k= 5 vth(k)/vnorm = 0.0744376
```



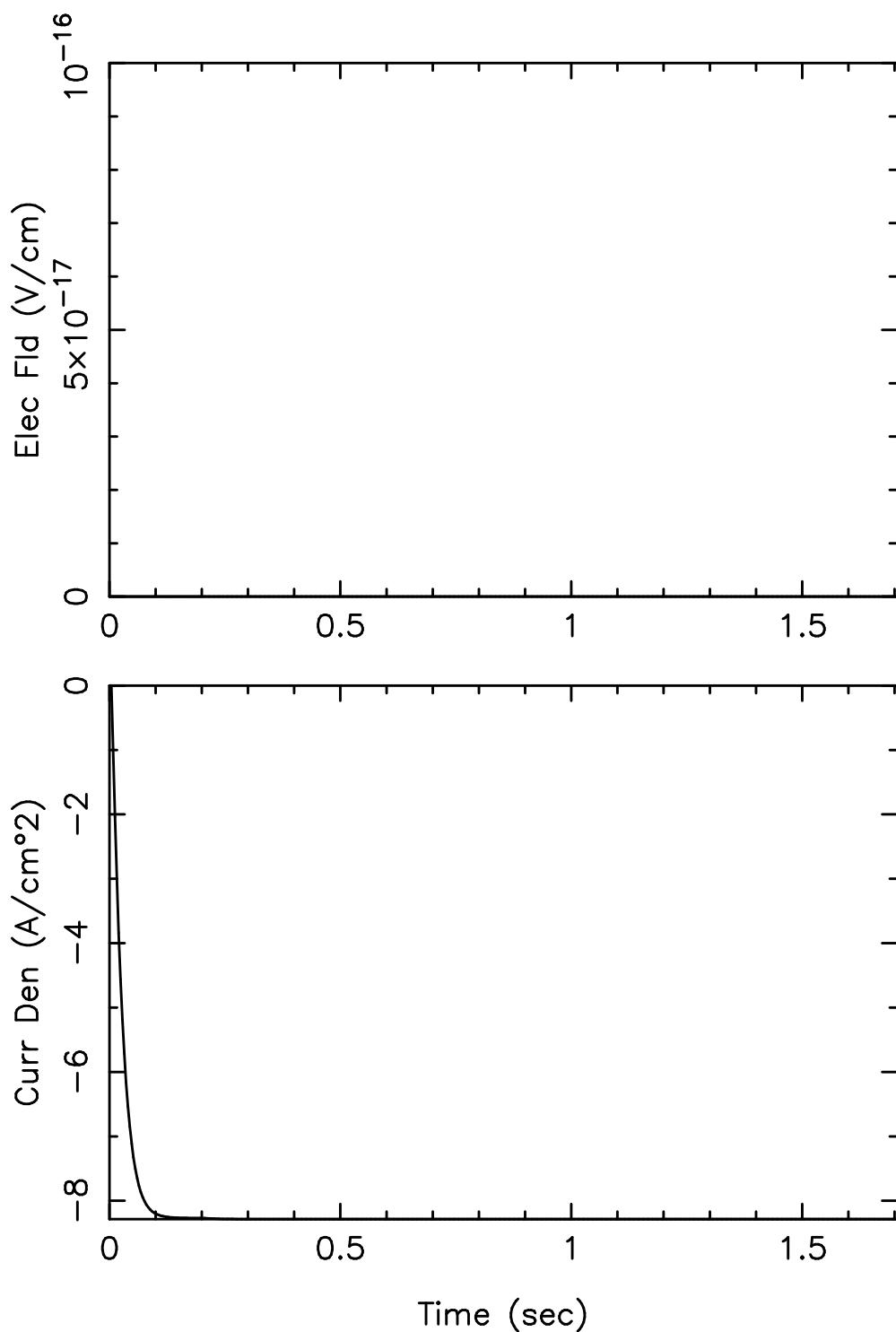
Electric field = 0.0000E+00 (V/cm)  
FSA current den of species 1 = 4.0078E+01 Amps/cm\*\*2



Species: 1 Current = $0.4008E+02$  Amps/cm $^2$

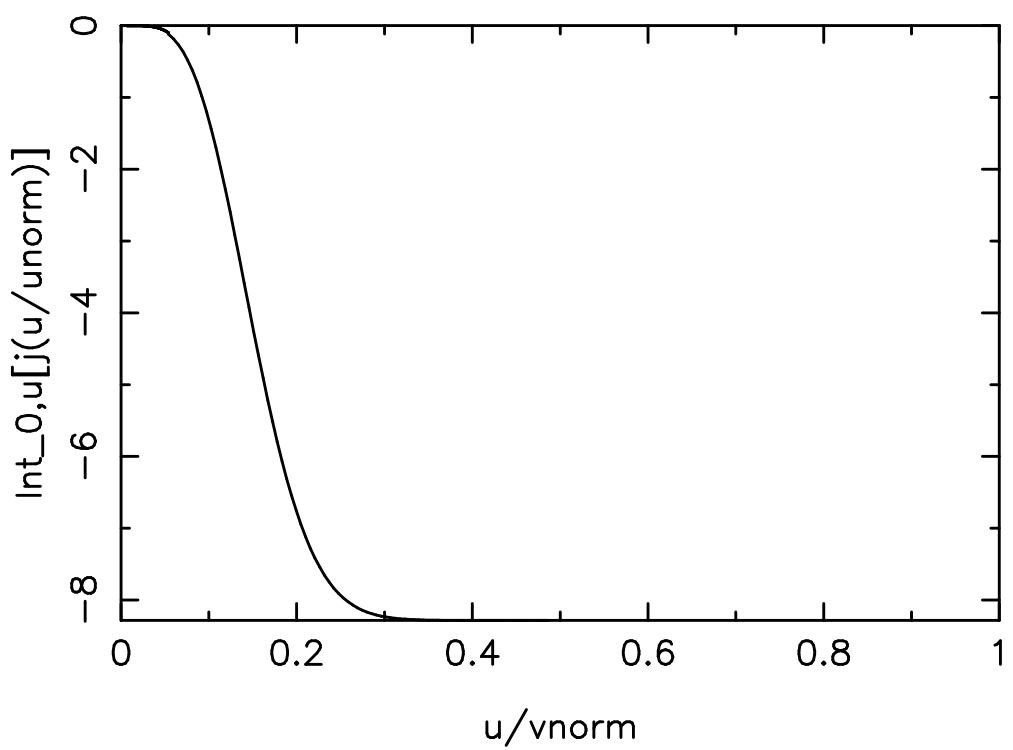
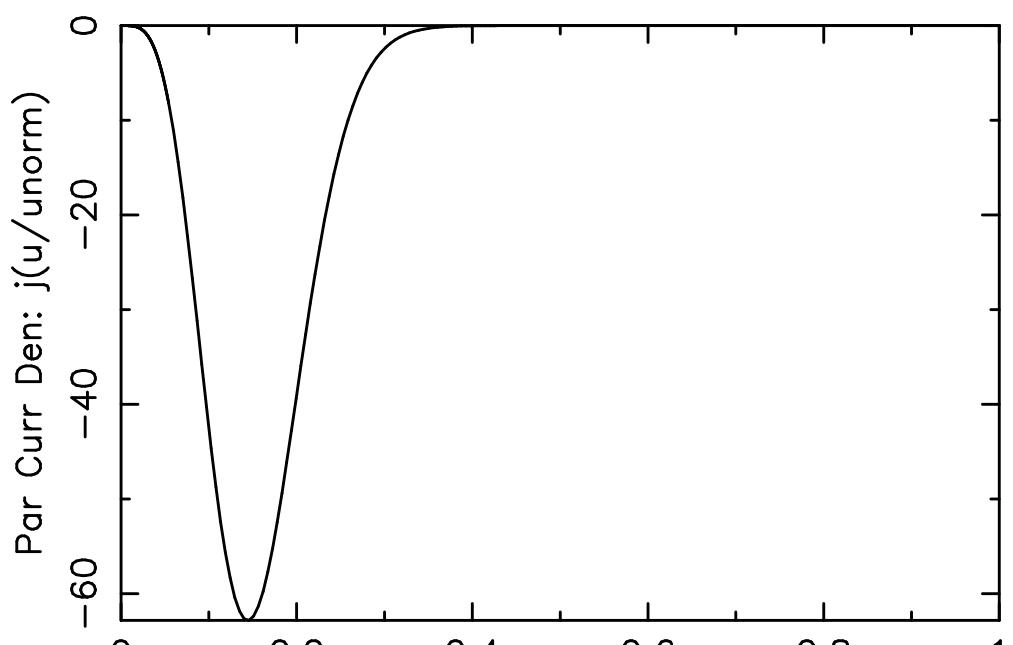


Species: 1 Power =-.1921E-35 Watts/cc

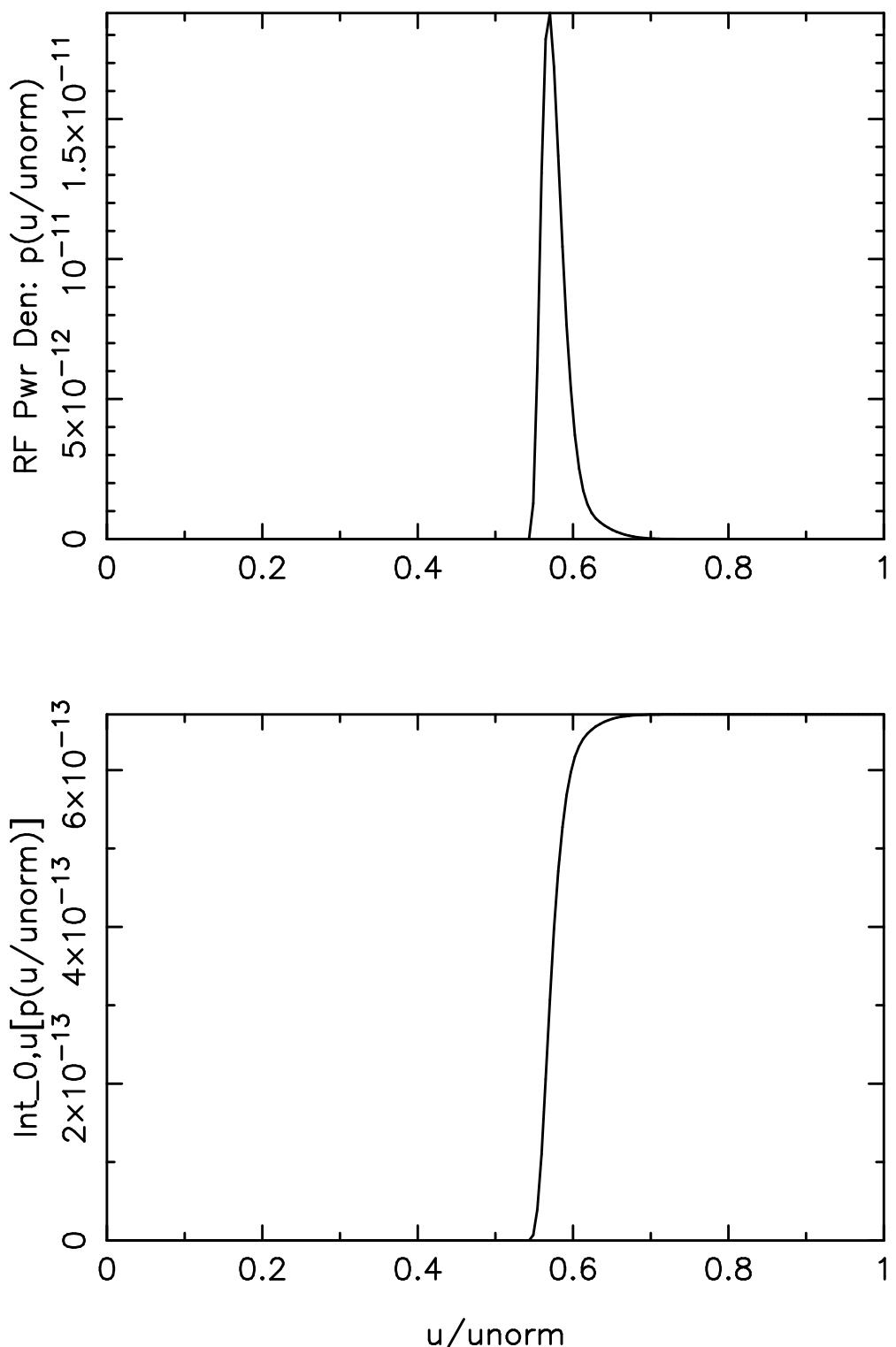


Electric field = 0.0000E+00 (V/cm)  
 FSA current den of species 2 = -8.2845E+00 Amps/cm\*\*2

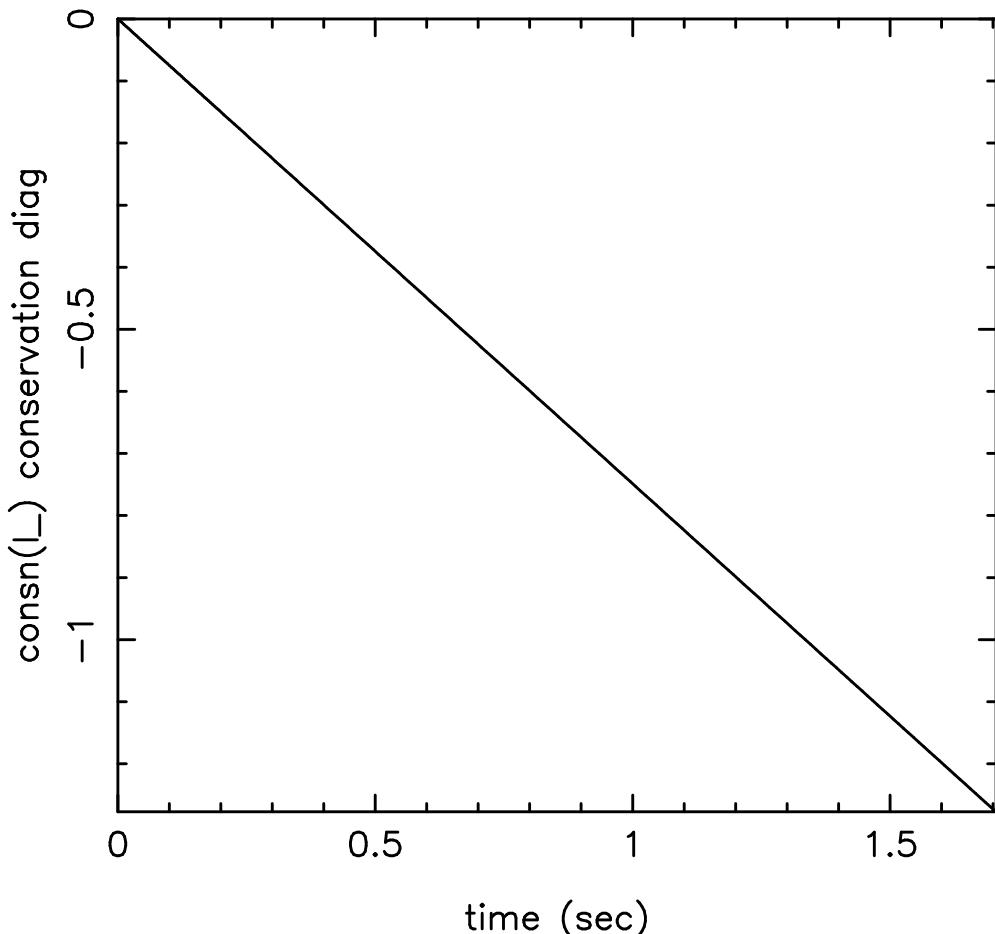
Current drive efficiency  $j/(2\pi R \cdot prf)$  = -1.1123E+10 A/W  
 Electron current (units  $ne \cdot q \cdot v_{th}(kelec, lr_*)$ ) = -3.2136E-04  
 power (units:  $ne \cdot v_{th}(kelec, lr_*)^{**2} \cdot me \cdot nu0$ ) = 2.1564E-16  
 efficiency (j/p) (Fisch 1978 units) = -1.4903E+12  
 efficiency (j/p) (e/(m\*c\*nu\_c units) = -1.2542E+10  
 $v_{th}(kelec, lr_*) = \sqrt{T/m}$  = 2.7502E+09 cm/sec  
 $nu0 = 7.7128E+04$  Hz



Species: 2 Current =-.8285E+01 Amps/cm<sup>2</sup>



Species: 2 Power = $0.6710\text{E}-12$  Watts/cc

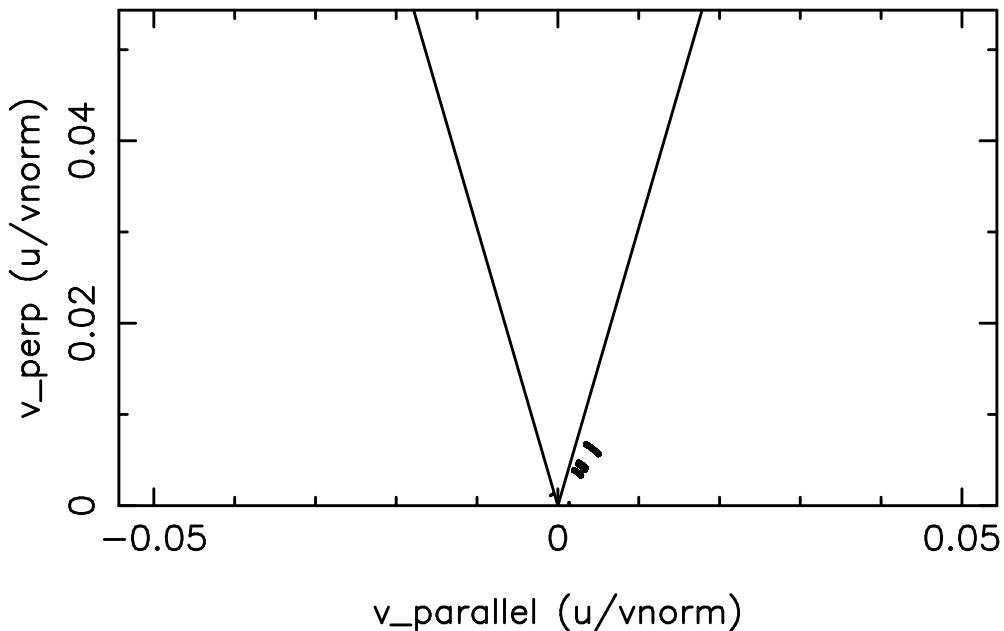


consn(l\_)= -1.2775E+00

Perfect conservation should yield machine accuracy,  
or about 1.e-14:

time step (n) is 200      time= 1.7060E+00 secs  
r/a= 1.3704E-01      radial position (R) = 1.8640E+02 cm

Species 1 Source Function (units: dist. f/sec)



time step n= 200      time= 1.71E+00 secs  
 $r/a = 1.370E-01$       radial position (R)= 1.8640E+02 cm  
 $rya = 1.370E-01$       R=rpcon= 1.8640E+02 cm, Surf# 8

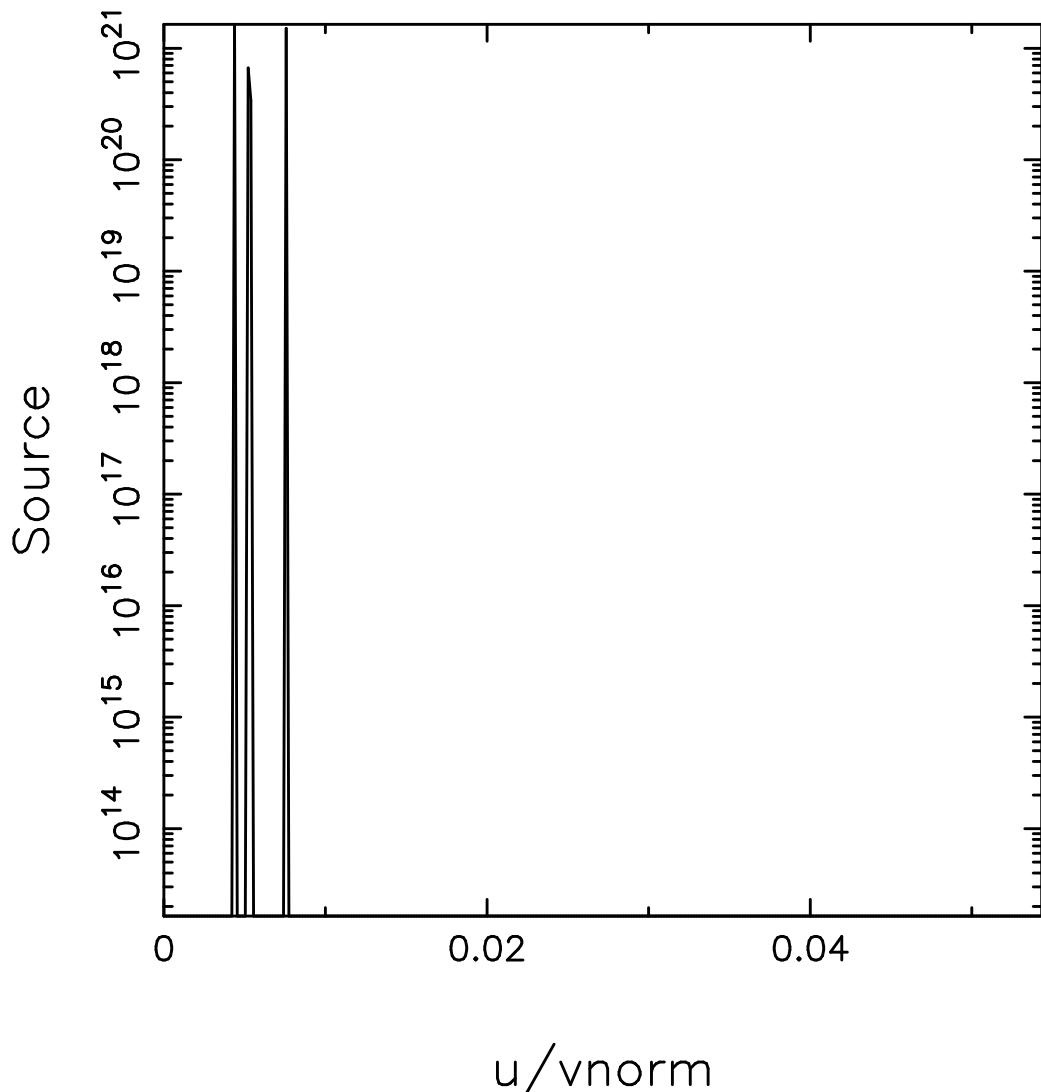
Particle source rate= 8.7655E+13 ptcls/cc/sec

Total source power [entr(..5..)]= 8.6782E-01 W/cc

Contour values:

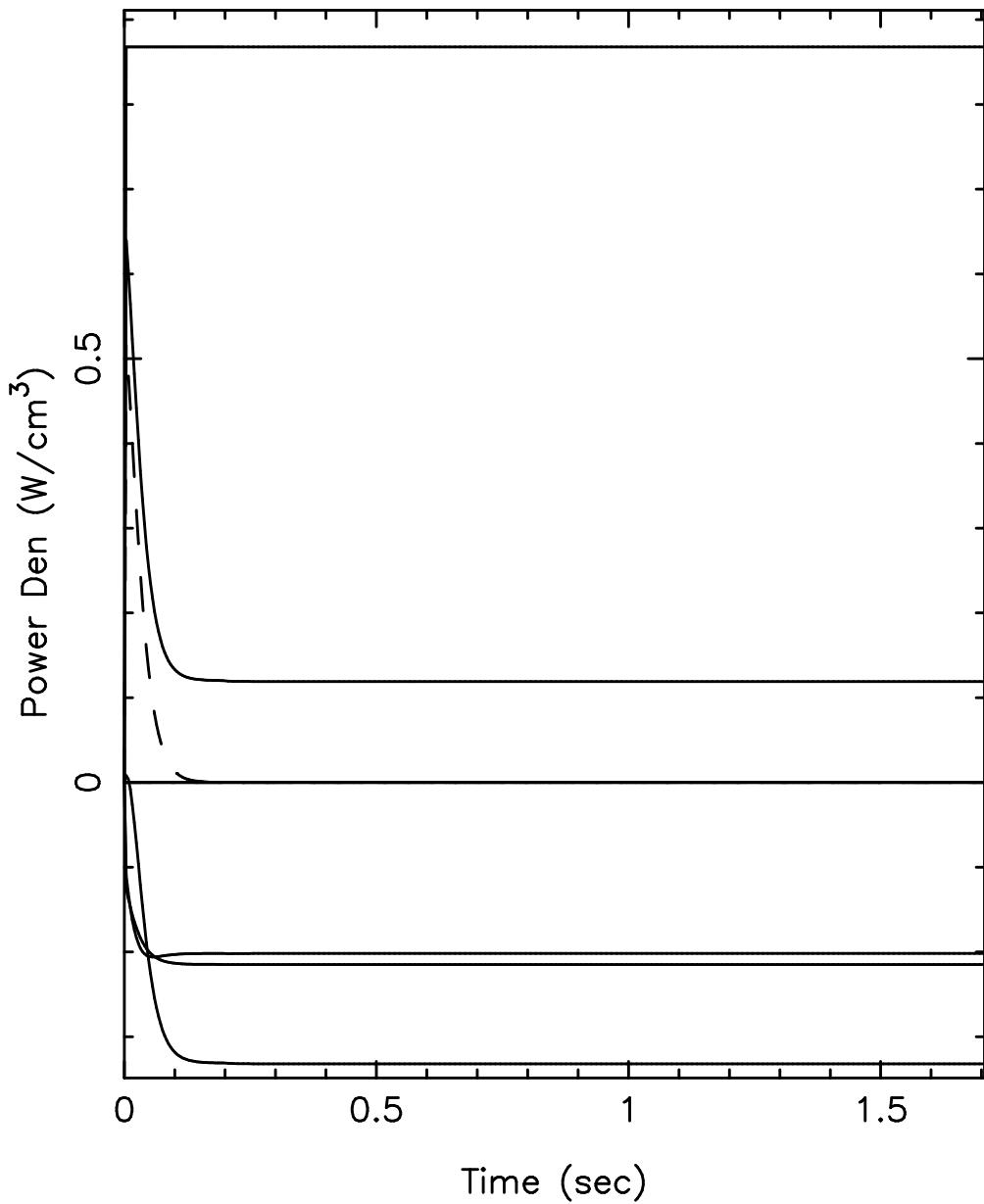
1.4745E+10	5.8702E+10	2.3370E+11	9.3036E+11
3.7038E+12	1.4745E+13	5.8702E+13	2.3370E+14
9.3036E+14	3.7038E+15	1.4745E+16	5.8702E+16
2.3370E+17	9.3036E+17	3.7038E+18	1.4745E+19
5.8702E+19	2.3370E+20	9.3036E+20	3.7038E+21

## Pitch Angle Avg Source vs. u

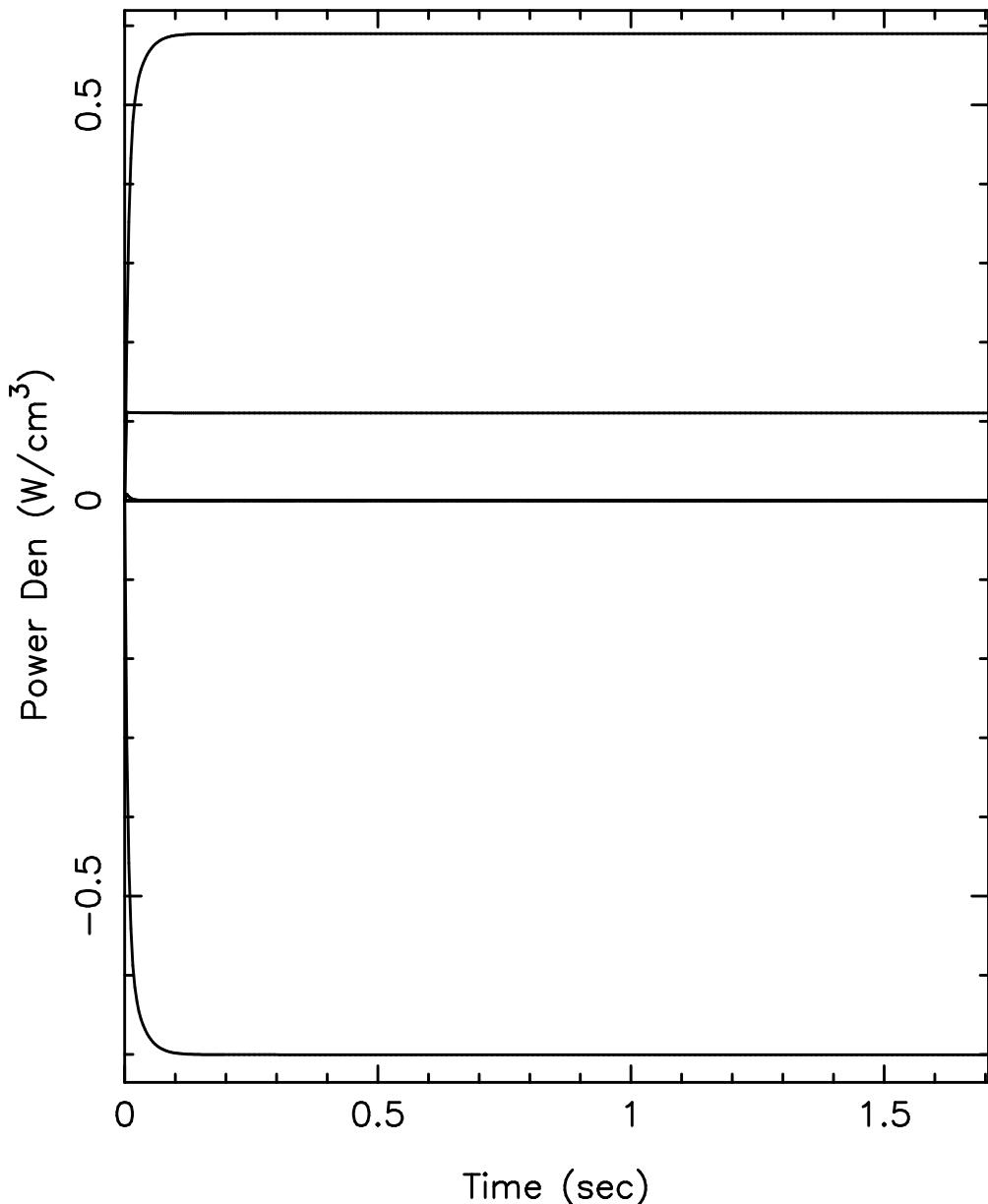


Particle source integrated over theta0 for species 1  
(normed so int(0,1)\*2pi\*x\*\*2\*dx=mid-plane source)  
vnorm= 3.6947E+10 cm/s

time step (n) is 200 time= 1.7060E+00 secs  
r/a= 1.3704E-01 radial position (R) = 1.8640E+02 cm

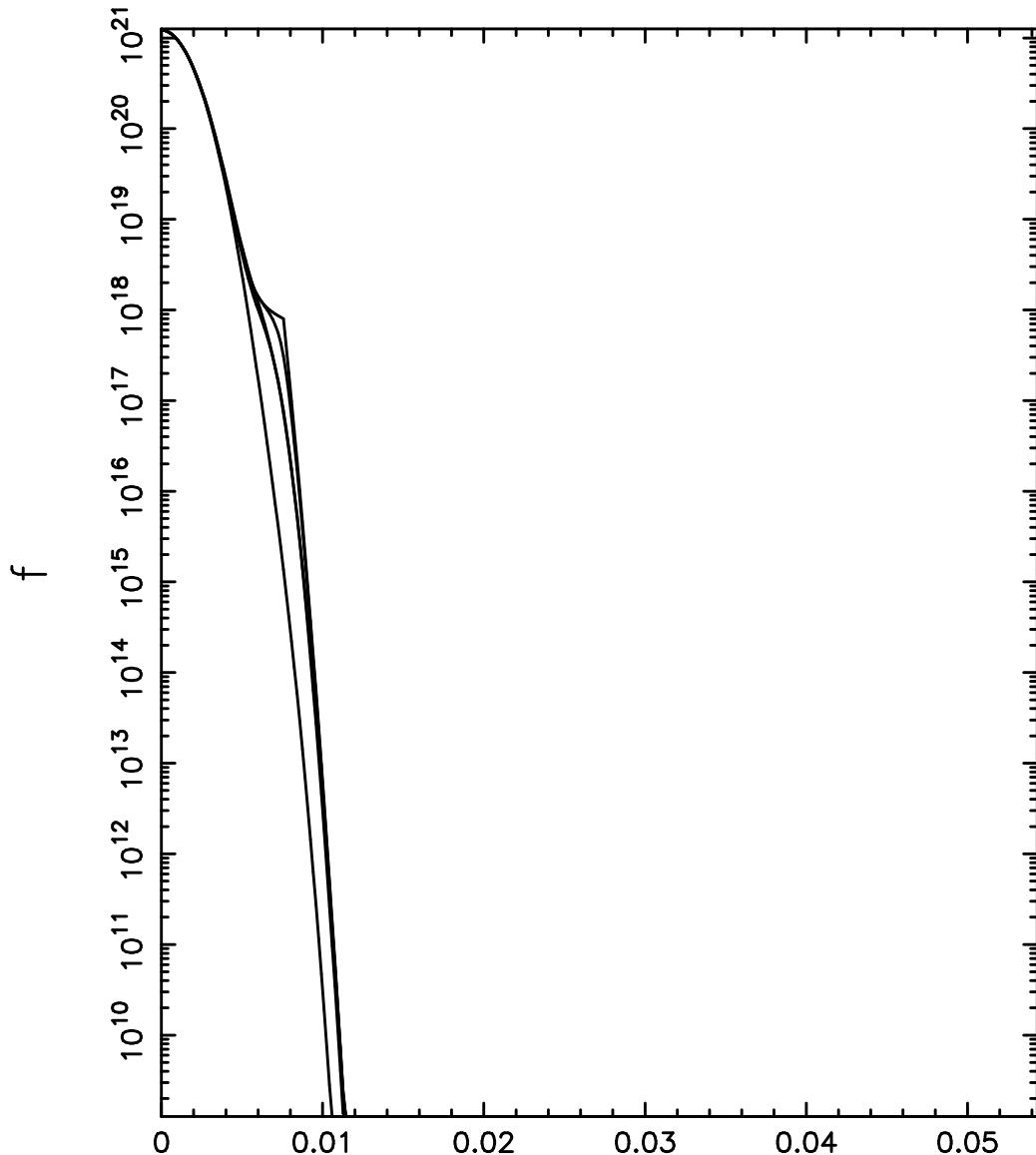


Species k= 1      Final powers in Watts/cc are:  
sum over all comp= 1.19E-01      From df/dt : -8.11E-13  
collisional transfer from Maxwellian elec.= -2.15E-01  
collisional transfer from Maxwellian ions= -3.32E-01  
collisional transfer from gens.= -2.02E-01  
ohmic drive= 0.00E+00  
RF drive= -1.92E-36  
particle sources= 8.68E-01  
loss-lossmode(k)= -2.49E-59      losses-torloss(k)= -9.84E-92  
losses due to runaway= 0.00E+00  
setting neg f to zero= 2.94E-22  
synchrotron rad losses= 0.00E+00  
phenomenological energy losses= 0.00E+00



Species k= 2      Final powers in Watts/cc are:  
sum over all comp= -3.74E-11      From df/dt : -1.27E-12  
collisional transfer from Maxwellian elec.= -7.00E-01  
collisional transfer from Maxwellian ions= 1.11E-01  
collisional transfer from gens.= 5.90E-01  
ohmic drive= 0.00E+00  
RF drive= 6.71E-13  
particle sources= 0.00E+00  
loss-lossmode(k)= 0.00E+00      losses-torloss(k)= -6.12E-92  
losses due to runaway= 0.00E+00  
setting neg f to zero= 0.00E+00  
synchrotron rad losses= 0.00E+00  
phenomenological energy losses= 0.00E+00

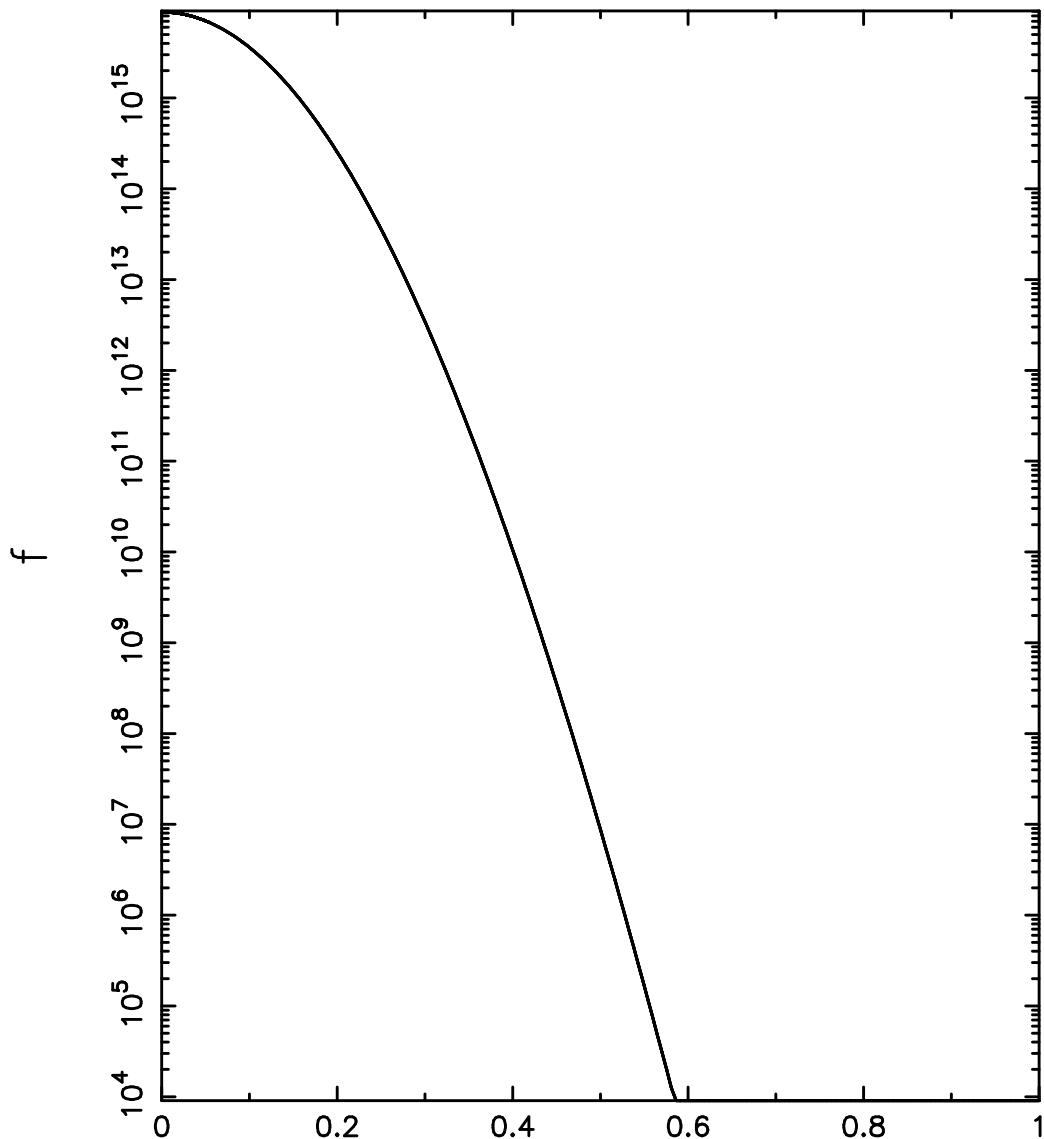
## Cuts of $f$ vs. $v$ , at cnst pitch angle



$u/v_{\text{norm}}$

Distribution function vs. velocity for some angles  
Species number=1, enorm= 3.00D+02  
time step (n)= 200 time= 0.170600E+01 secs  
r/a= 1.37E-01 radial position(R)= 1.864E+02 cm

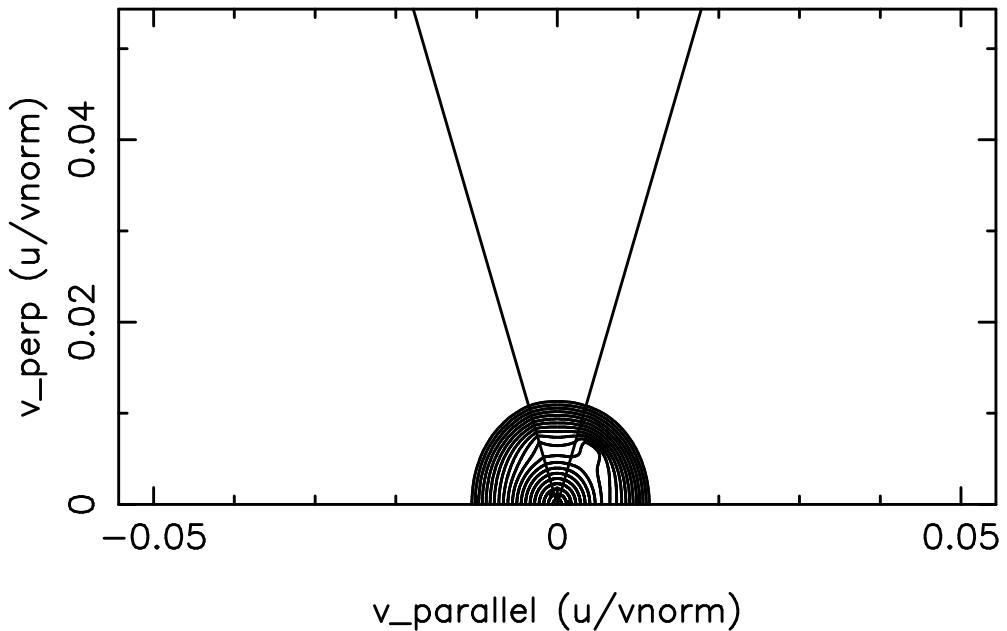
## Cuts of f vs. v, at cnst pitch angle



$u/v_{\text{norm}}$

Distribution function vs. velocity for some angles  
Species number=2, enorm= 3.00D+02  
time step (n)= 200 time= 0.170600E+01 secs  
r/a= 1.37E-01 radial position(R)= 1.864E+02 cm

### Species 1 Distribution Function Contour Plot

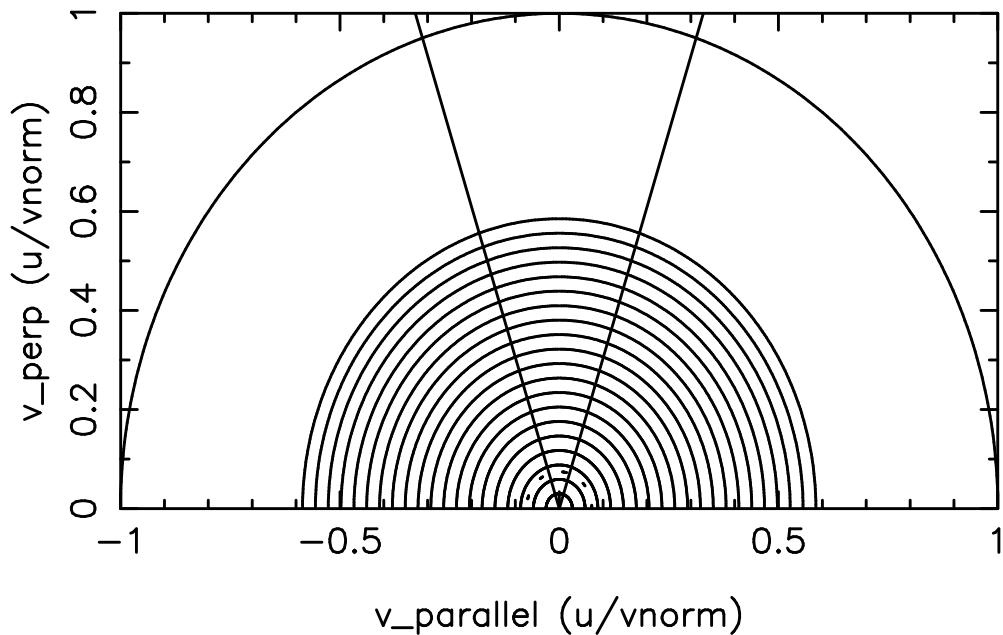


time step n= 200      time= 1.71E+00 secs  
 $r/a = 1.370E-01$       radial position (R)= 1.8640E+02 cm  
 $rya = 1.370E-01$       R=rpcon= 1.8640E+02 cm, Surf# 8

Contour values:

1.132420E+21	8.918400E+20	5.998356E+20	3.452594E+20
1.705521E+20	7.255963E+19	2.669615E+19	8.533542E+18
2.381925E+18	5.836797E+17	1.262687E+17	2.425374E+16
4.160411E+15	6.410273E+14	8.922316E+13	1.128147E+13
1.302860E+12	1.381495E+11	1.351770E+10	1.226430E+09

### Species 2 Distribution Function Contour Plot



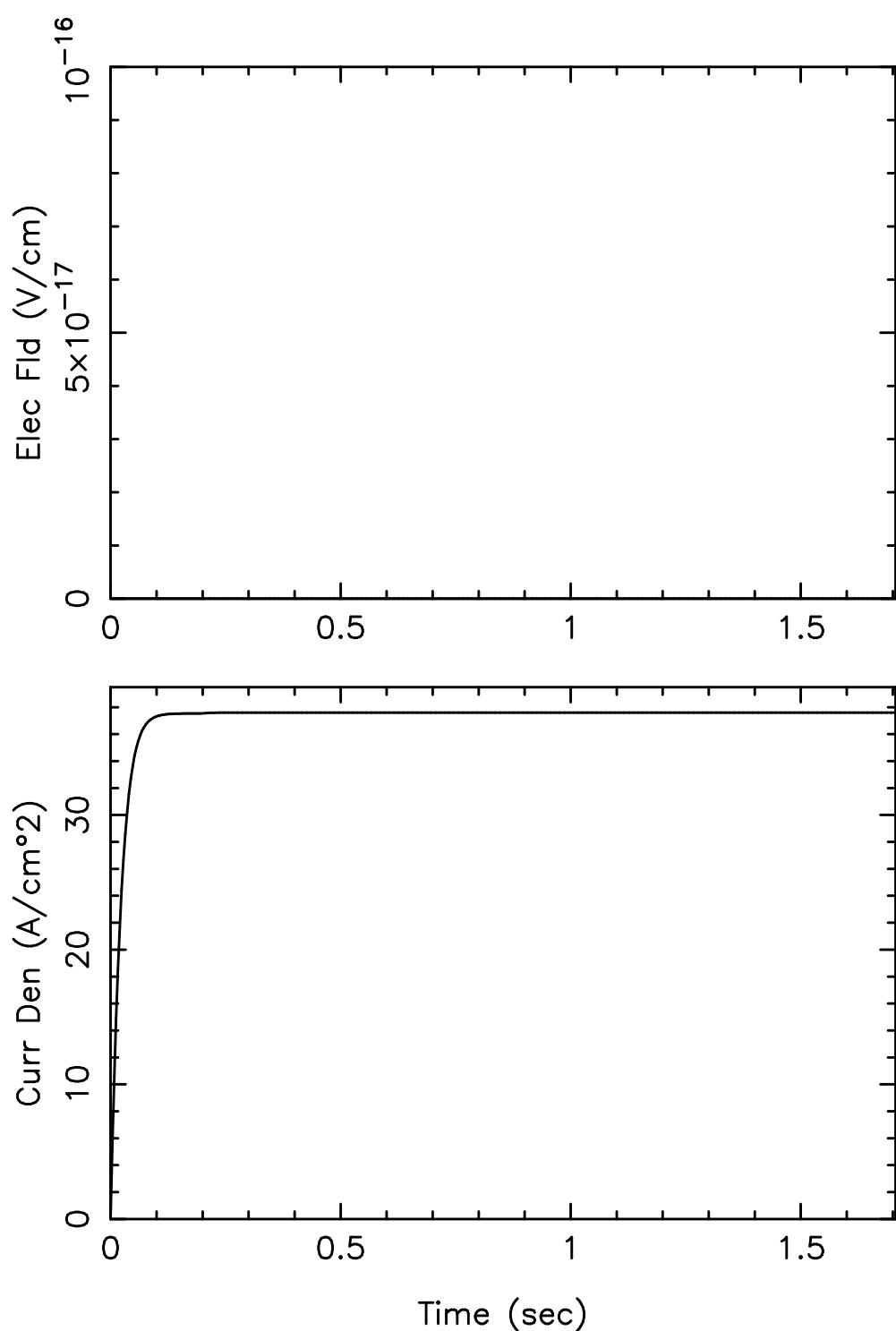
time step n= 200      time= 1.71E+00 secs  
 $r/a = 1.370E-01$       radial position (R)= 1.8640E+02 cm  
 $rya = 1.370E-01$       R=rpcon= 1.8640E+02 cm, Surf# 8

Contour values:

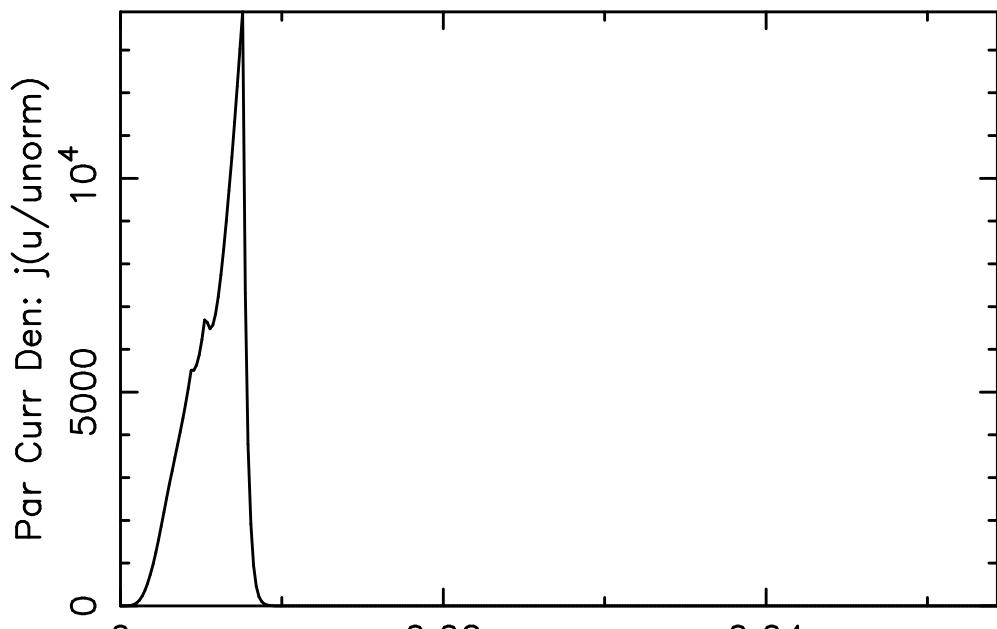
8.151668E+15	6.470604E+15	4.407640E+15	2.580285E+15
1.300784E+15	5.661294E+14	2.133532E+14	6.986120E+13
1.995092E+13	4.989402E+12	1.097407E+12	2.132444E+11
3.677850E+10	5.656771E+09	7.795963E+08	9.673066E+07
1.085677E+07	1.107383E+06	1.031171E+05	8.804885E+03

## LOCAL RADIAL QUANTITIES

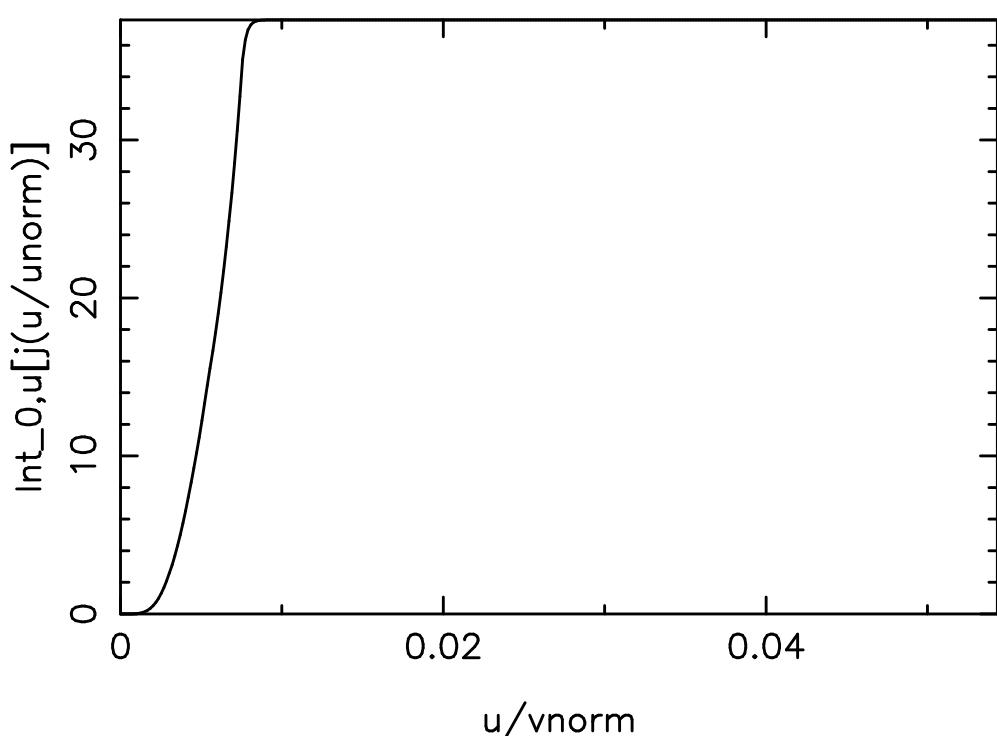
```
time step n= 200,      time= 1.7060E+00 secs
flux surf= 9      total flux surfs= 55
r/a= 1.552E-01      radial position (R)= 1.8747E+02 cms
rya= 1.552E-01      R=rpcon= 1.875E+02 cm
    enormi, enorme(=enorm) (kev) = 3250.000   300.000
vnorm/c = 1.2324136
vthe (sqrt(te/me))/c = 0.0913228
vthe/vnorm = 0.0741008
k= 1 vth(k)/vnorm = 0.0014123
k= 2 vth(k)/vnorm = 0.0741008
k= 3 vth(k)/vnorm = 0.0014123
k= 4 vth(k)/vnorm = 0.0001411
k= 5 vth(k)/vnorm = 0.0741008
```



Electric field = 0.0000E+00 (V/cm)  
FSA current den of species 1 = 3.7603E+01 Amps/cm\*\*2

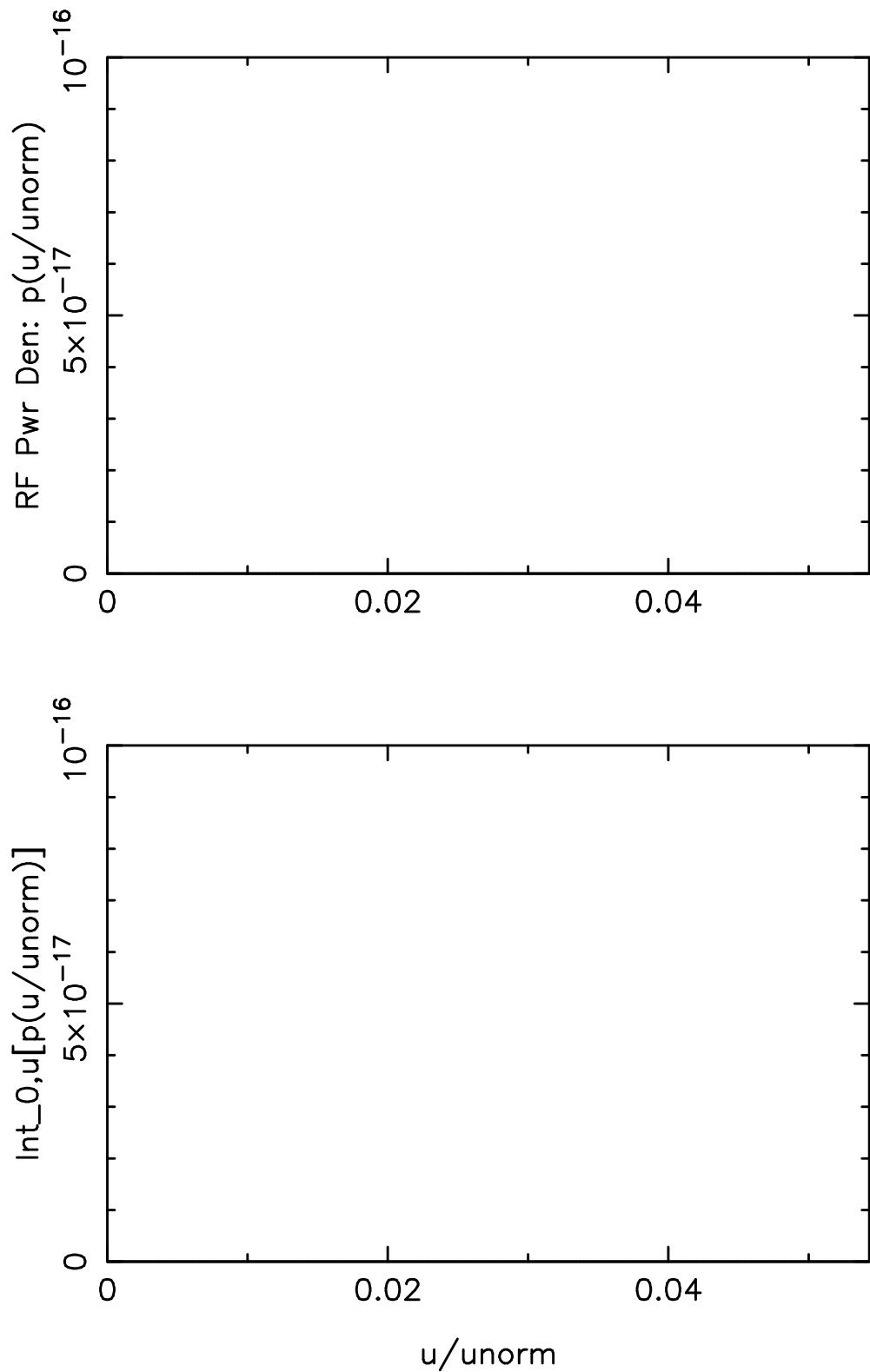


$u/\text{vnorm}$

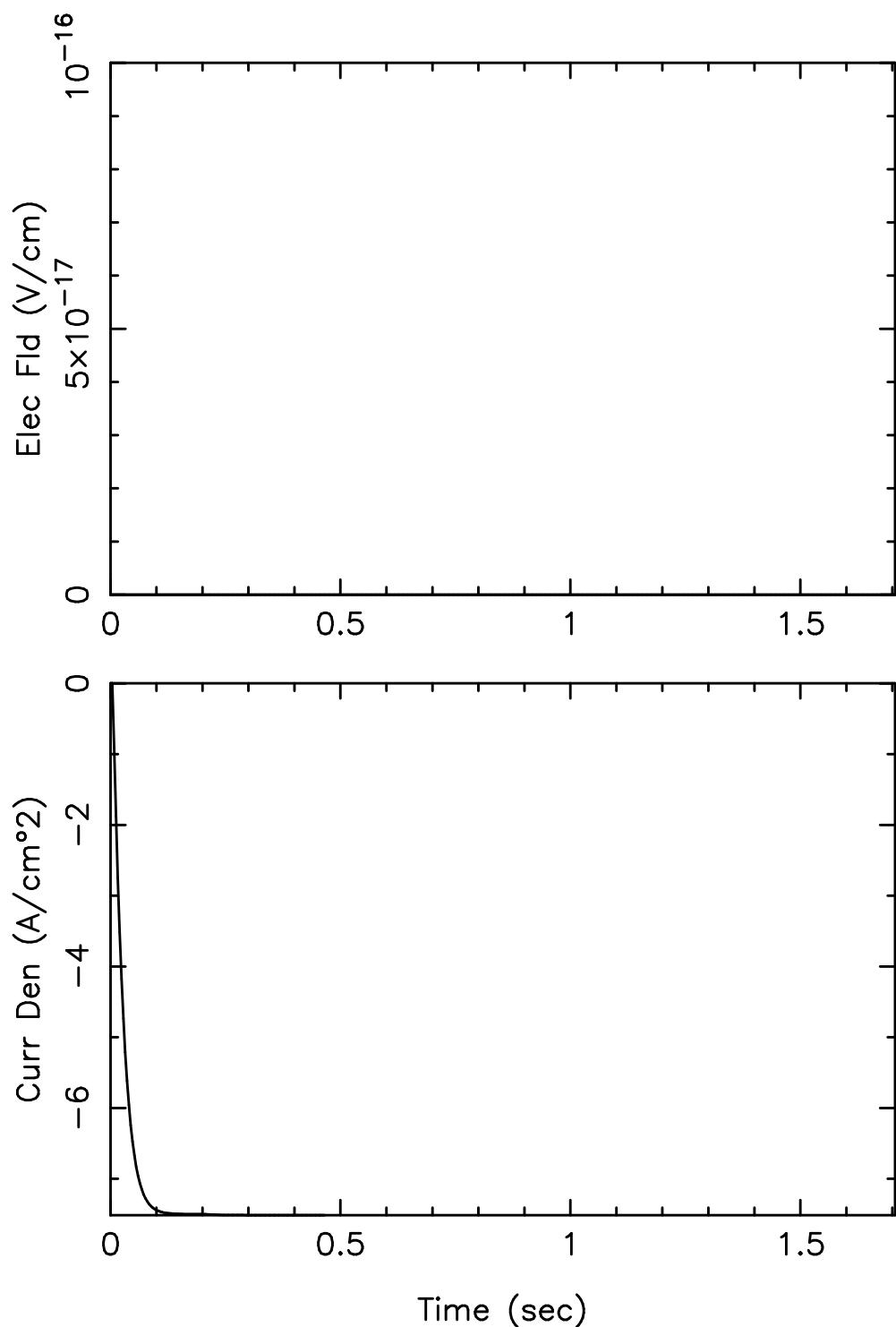


$u/\text{vnorm}$

Species: 1 Current = $0.3760\text{E+02}$  Amps/cm $^2$

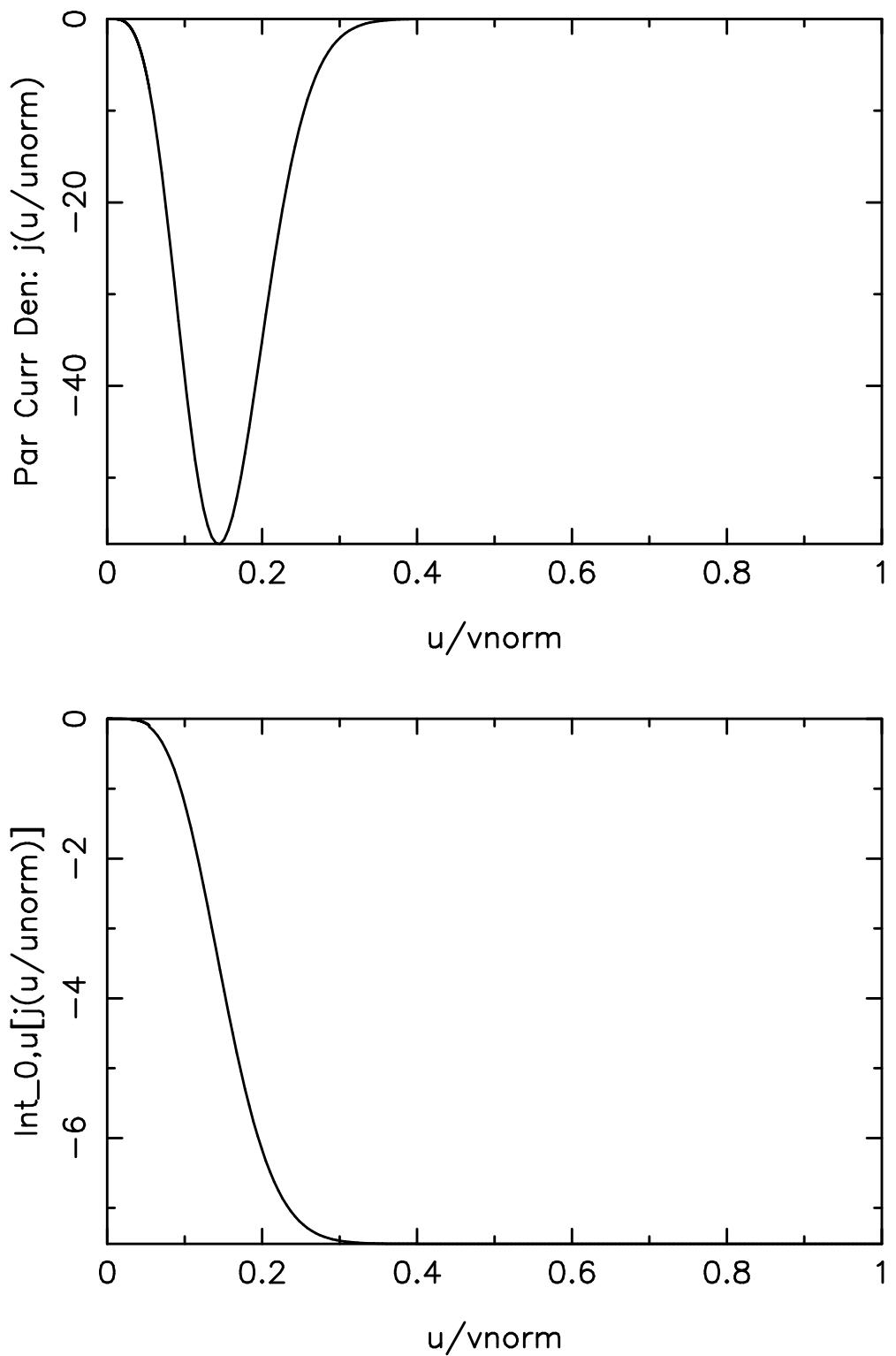


Species: 1 Power =-.2430E-63 Watts/cc

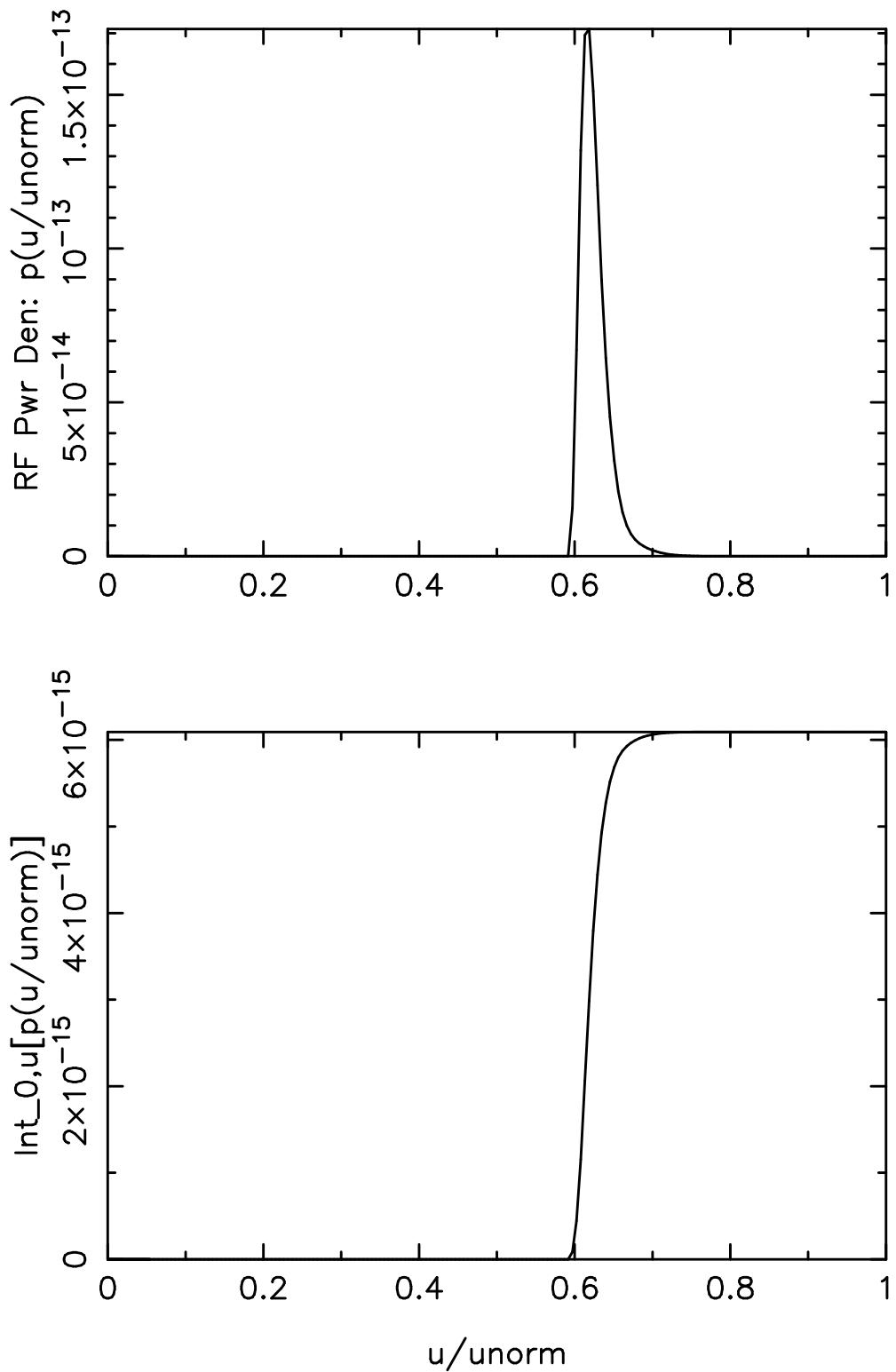


Electric field = 0.0000E+00 (V/cm)  
 FSA current den of species 2 = -7.5136E+00 Amps/cm\*\*2

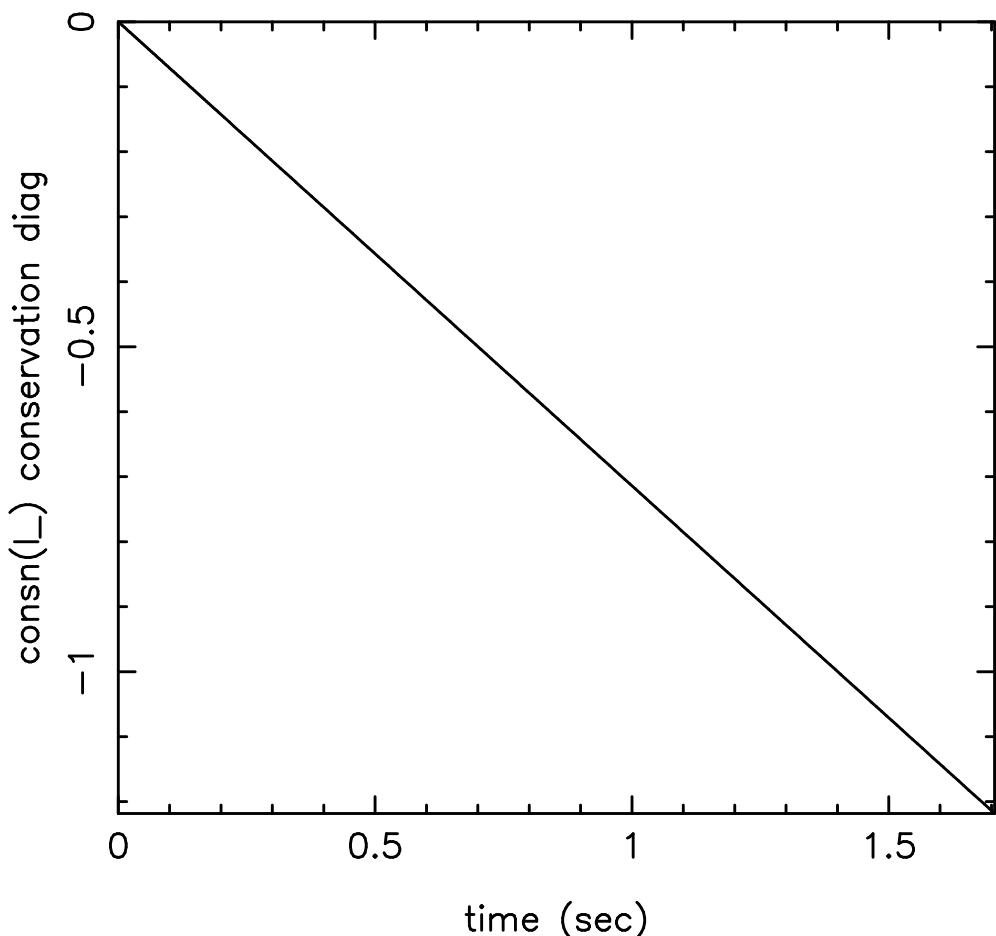
Current drive efficiency  $j/(2\pi R \cdot prf)$  = -1.1130E+12 A/W  
 Electron current (units  $ne \cdot q \cdot v_{th}(kelec, lr_*)$ ) = -2.9474E-04  
 power (units:  $ne \cdot v_{th}(kelec, lr_*)^{**2} \cdot me \cdot nu0$ ) = 1.9750E-18  
 efficiency ( $j/p$ ) (Fisch 1978 units) = -1.4924E+14  
 efficiency ( $j/p$ ) ( $e/(m \cdot c \cdot nu_c$  units) = -1.2446E+12  
 $v_{th}(kelec, lr_*) = \sqrt{T/m}$  = 2.7378E+09 cm/sec  
 $nu0 = 7.7663E+04$  Hz



Species: 2 Current =-.7514E+01 Amps/cm<sup>2</sup>



Species: 2 Power = $0.6092\text{E}-14$  Watts/cc

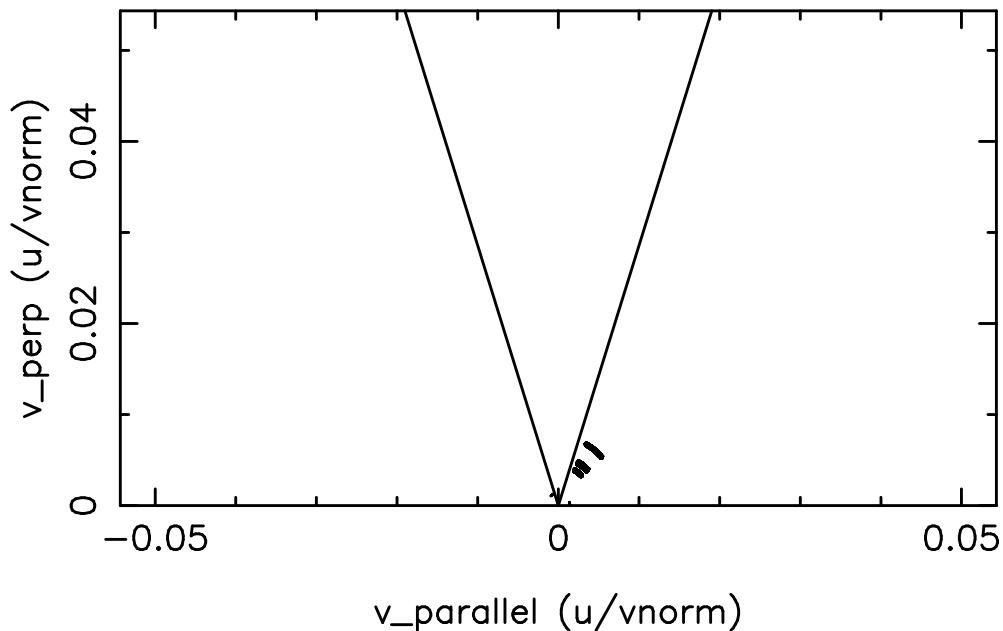


consn(l\_)= -1.2181E+00

Perfect conservation should yield machine accuracy,  
or about 1.e-14:

time step (n) is 200      time= 1.7060E+00 secs  
r/a= 1.5519E-01      radial position (R) = 1.8747E+02 cm

Species 1 Source Function (units: dist. f/sec)



time step n= 200      time= 1.71E+00 secs  
 $r/a = 1.552E-01$       radial position (R)= 1.8747E+02 cm  
 $rya = 1.552E-01$       R=rpcon= 1.8747E+02 cm, Surf# 9

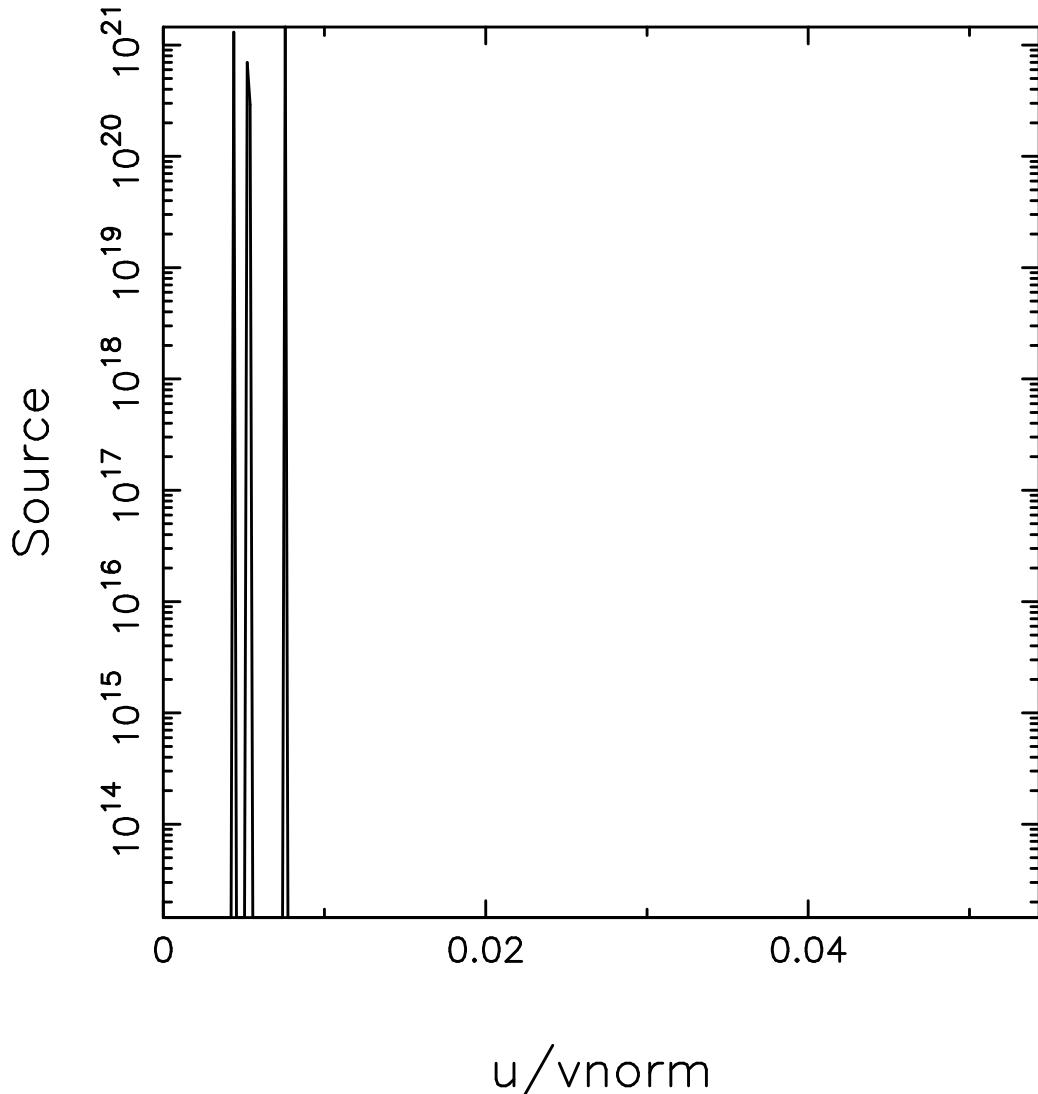
Particle source rate= 8.3018E+13 ptcls/cc/sec

Total source power [entr(..5..)]= 8.3776E-01 W/cc

Contour values:

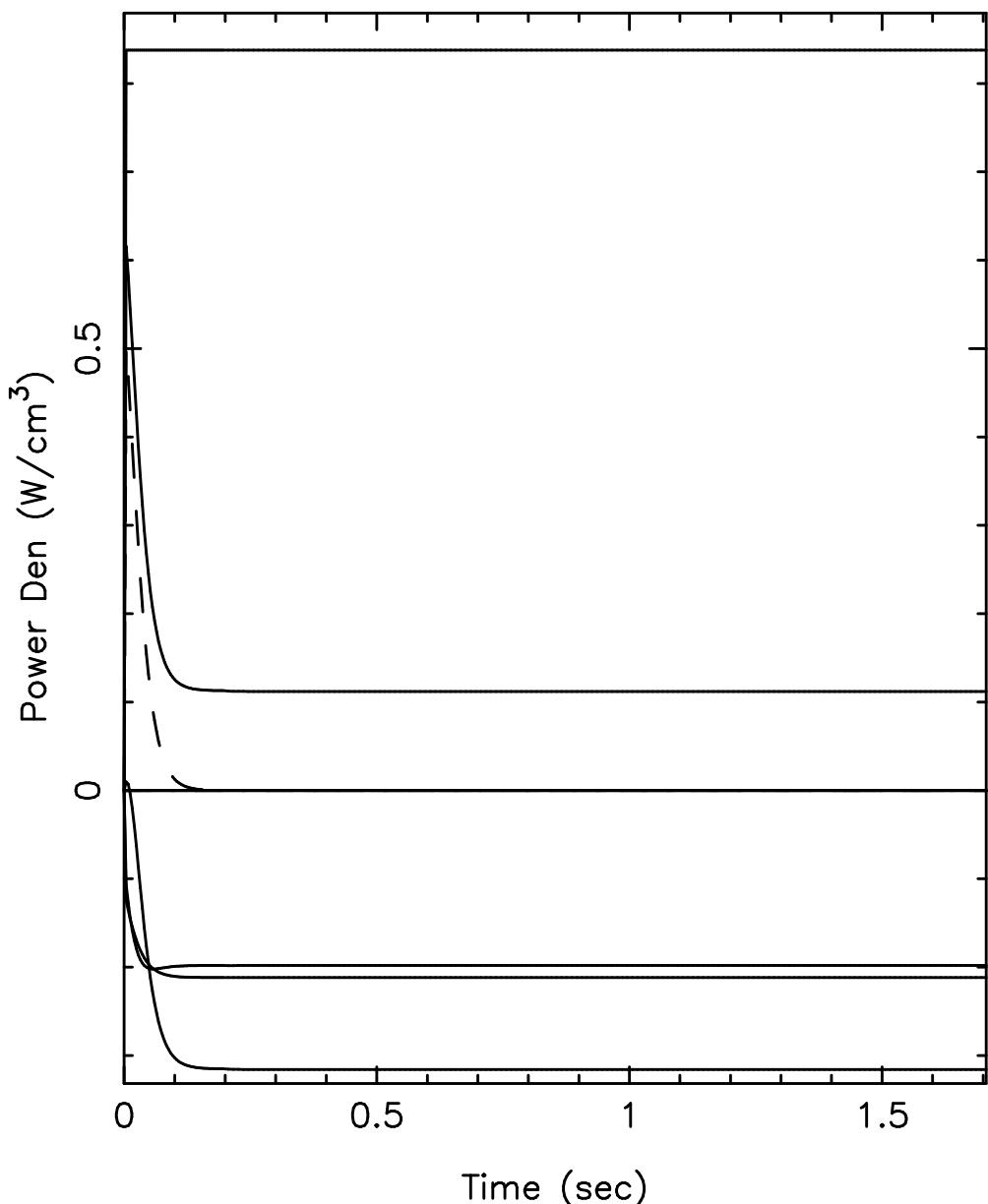
1.2603E+10	5.0172E+10	1.9974E+11	7.9517E+11
3.1656E+12	1.2603E+13	5.0172E+13	1.9974E+14
7.9517E+14	3.1656E+15	1.2603E+16	5.0172E+16
1.9974E+17	7.9517E+17	3.1656E+18	1.2603E+19
5.0172E+19	1.9974E+20	7.9517E+20	3.1656E+21

## Pitch Angle Avg Source vs. u

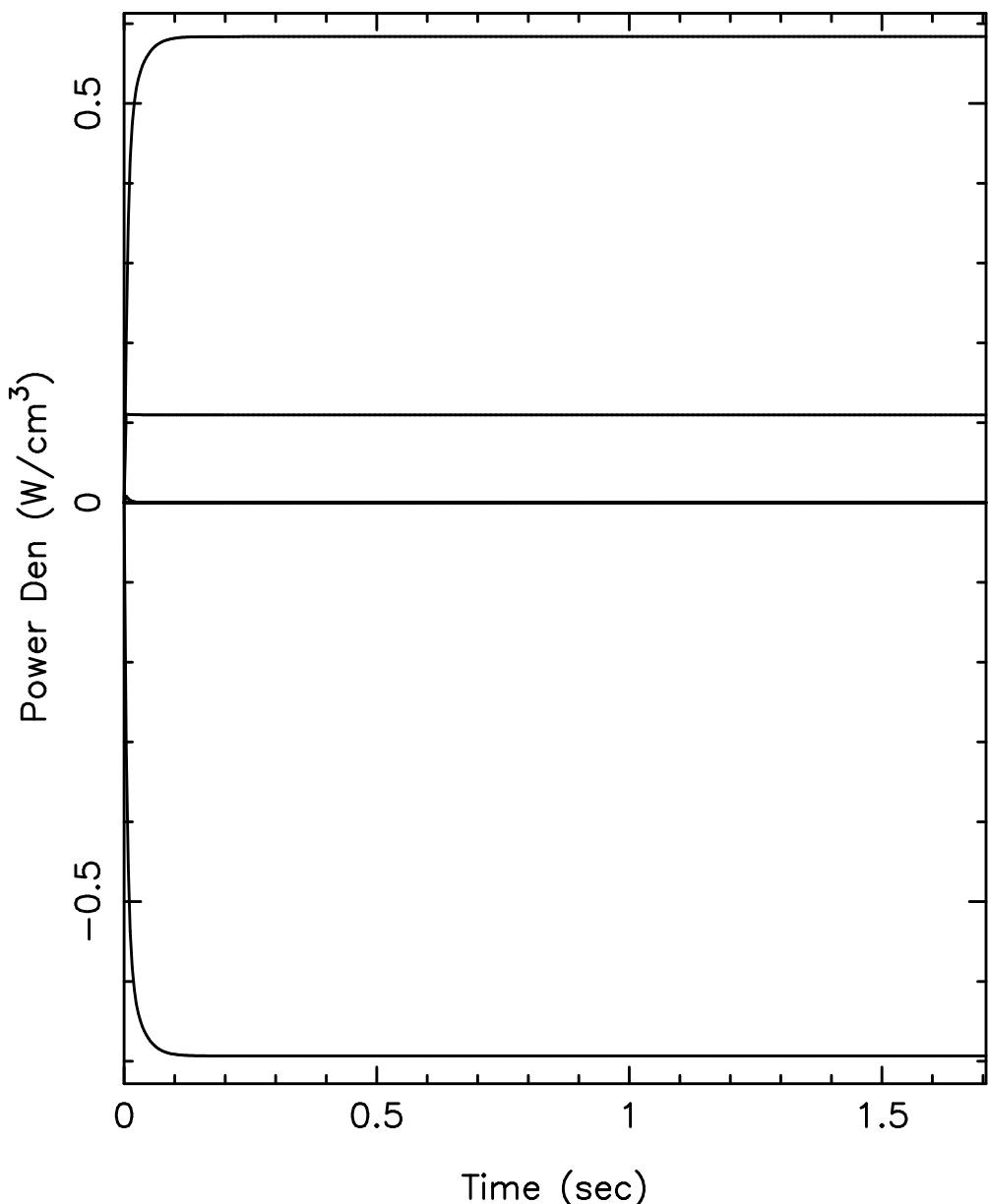


Particle source integrated over theta0 for species 1  
(normed so  $\int(0,1)2\pi*x**2*dx = \text{mid-plane source}$ )  
vnorm= 3.6947E+10 cm/s

time step (n) is 200 time= 1.7060E+00 secs  
r/a= 1.5519E-01 radial position (R) = 1.8747E+02 cm

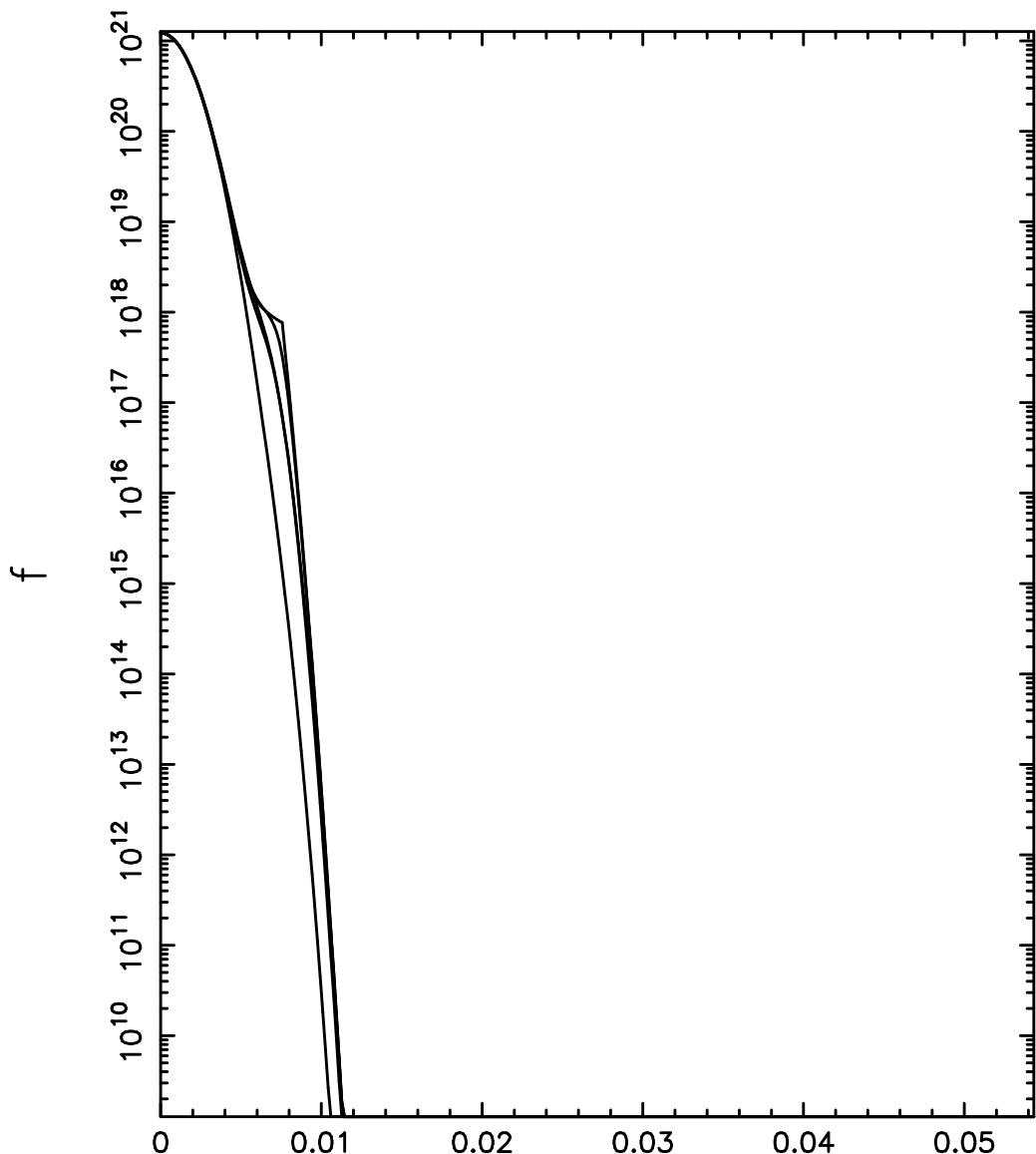


Species k= 1      Final powers in Watts/cc are:  
sum over all comp= 1.12E-01      From df/dt : -2.85E-12  
collisional transfer from Maxwellian elec.= -2.12E-01  
collisional transfer from Maxwellian ions= -3.16E-01  
collisional transfer from gens.= -1.98E-01  
ohmic drive= 0.00E+00  
RF drive= -2.43E-64  
particle sources= 8.38E-01  
loss-lossmode(k)= -1.18E-53      losses-torloss(k)= -9.67E-92  
losses due to runaway= 0.00E+00  
setting neg f to zero= 8.97E-23  
synchrotron rad losses= 0.00E+00  
phenomenological energy losses= 0.00E+00



Species k= 2      Final powers in Watts/cc are:  
 sum over all comp= -1.60E-10      From df/dt : -3.65E-12  
 collisional transfer from Maxwellian elec.= -6.93E-01  
 collisional transfer from Maxwellian ions= 1.10E-01  
 collisional transfer from gens.= 5.84E-01  
 ohmic drive= 0.00E+00  
 RF drive= 6.09E-15  
 particle sources= 0.00E+00  
 loss-lossmode(k)= 0.00E+00      losses-torloss(k)= -6.03E-92  
 losses due to runaway= 0.00E+00  
 setting neg f to zero= 0.00E+00  
 synchrotron rad losses= 0.00E+00  
 phenomenological energy losses= 0.00E+00

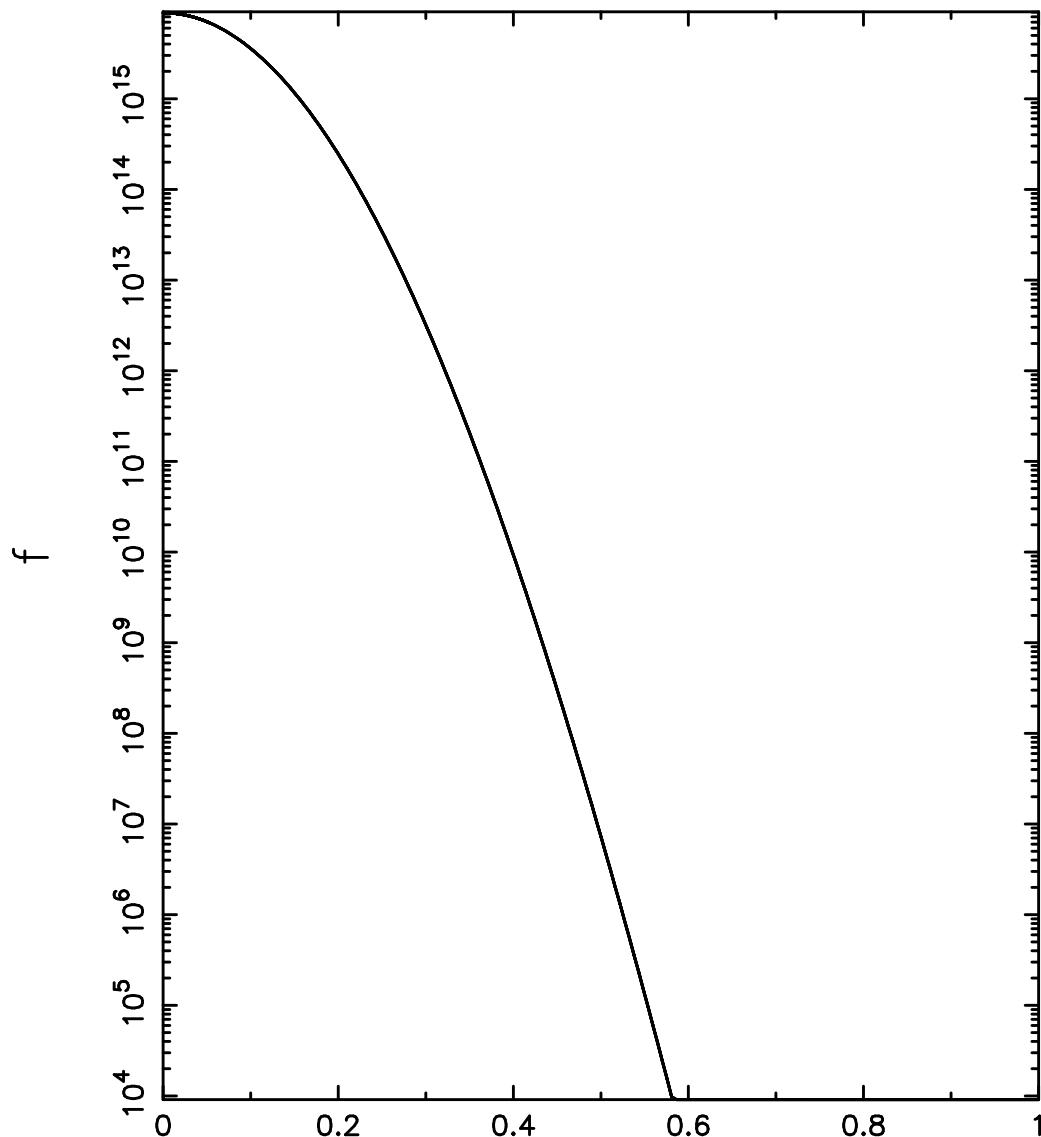
## Cuts of $f$ vs. $v$ , at cnst pitch angle



$u/v_{\text{norm}}$

Distribution function vs. velocity for some angles  
Species number=1, enorm= 3.00D+02  
time step (n)= 200 time= 0.170600E+01 secs  
r/a= 1.55E-01 radial position(R)= 1.875E+02 cm

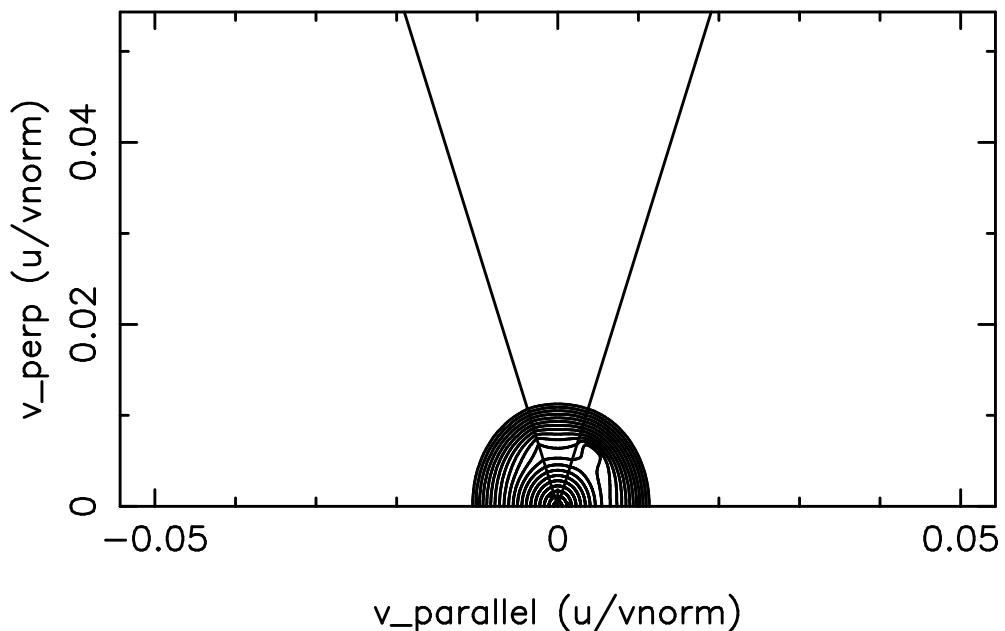
## Cuts of $f$ vs. $v$ , at cnst pitch angle



$u/v_{\text{norm}}$

Distribution function vs. velocity for some angles  
Species number=2, enorm= 3.00D+02  
time step (n)= 200 time= 0.170600E+01 secs  
r/a= 1.55E-01 radial position(R)= 1.875E+02 cm

### Species 1 Distribution Function Contour Plot

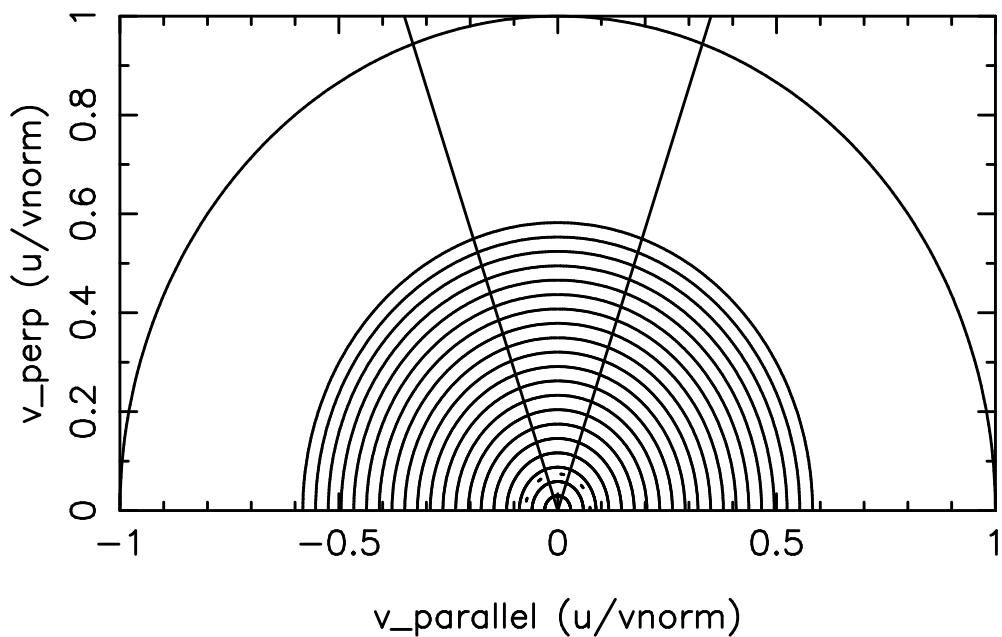


time step n= 200      time= 1.71E+00 secs  
 $r/a = 1.552E-01$       radial position (R)= 1.8747E+02 cm  
 $rya = 1.552E-01$       R=rpcon= 1.8747E+02 cm, Surf# 9

Contour values:

1.139019E+21	8.972920E+20	6.037787E+20	3.477403E+20
1.719026E+20	7.319341E+19	2.695225E+19	8.622703E+18
2.408732E+18	5.906631E+17	1.278513E+17	2.456711E+16
4.214851E+15	6.493568E+14	9.034887E+13	1.141604E+13
1.317073E+12	1.394678E+11	1.362339E+10	1.233458E+09

### Species 2 Distribution Function Contour Plot



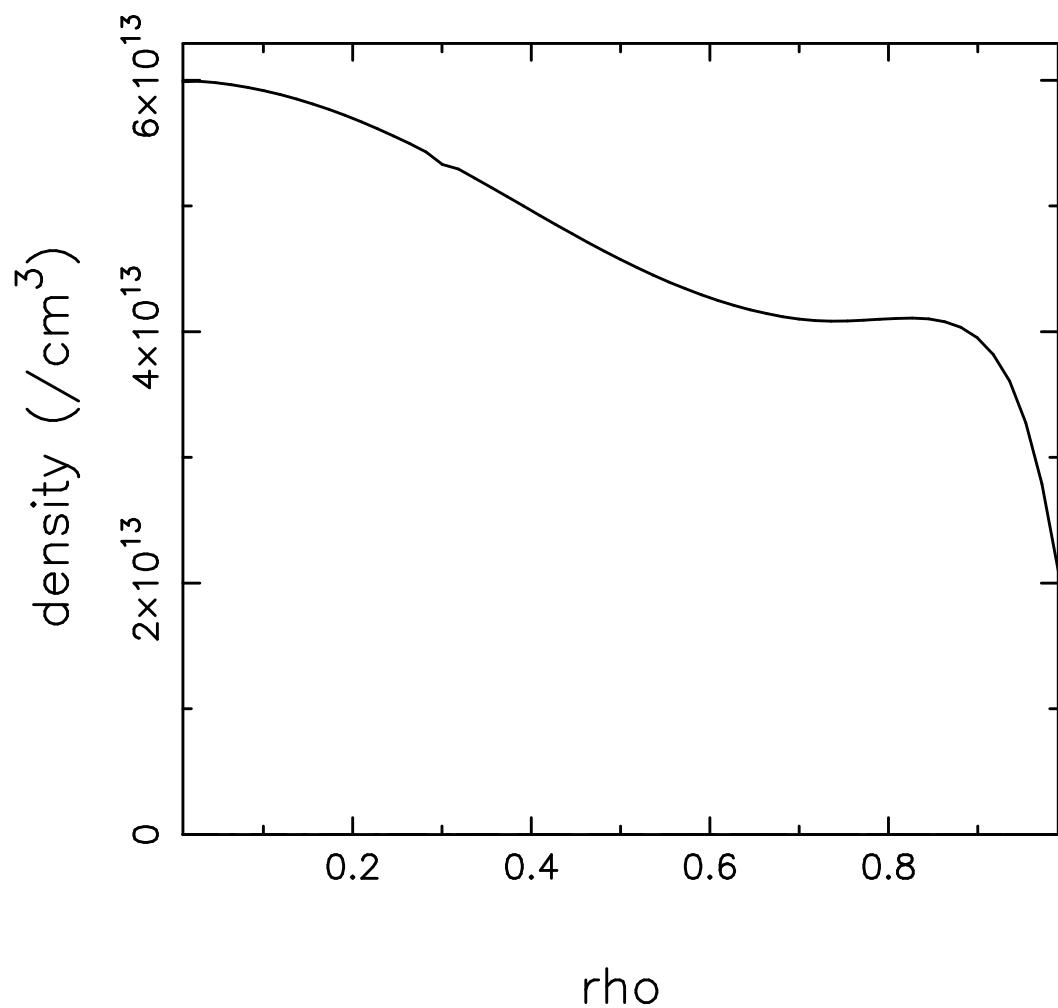
time step n= 200      time= 1.71E+00 secs  
 $r/a = 1.552E-01$       radial position (R)= 1.8747E+02 cm  
 $rya = 1.552E-01$       R=rpcon= 1.8747E+02 cm, Surf# 9

Contour values:

8.179376E+15	6.493984E+15	4.425093E+15	2.591697E+15
1.307263E+15	5.693049E+14	2.146925E+14	7.034688E+13
2.010253E+13	5.030225E+12	1.106916E+12	2.151661E+11
3.711644E+10	5.708605E+09	7.865395E+08	9.754229E+07
1.093921E+07	1.114574E+06	1.036406E+05	8.834175E+03

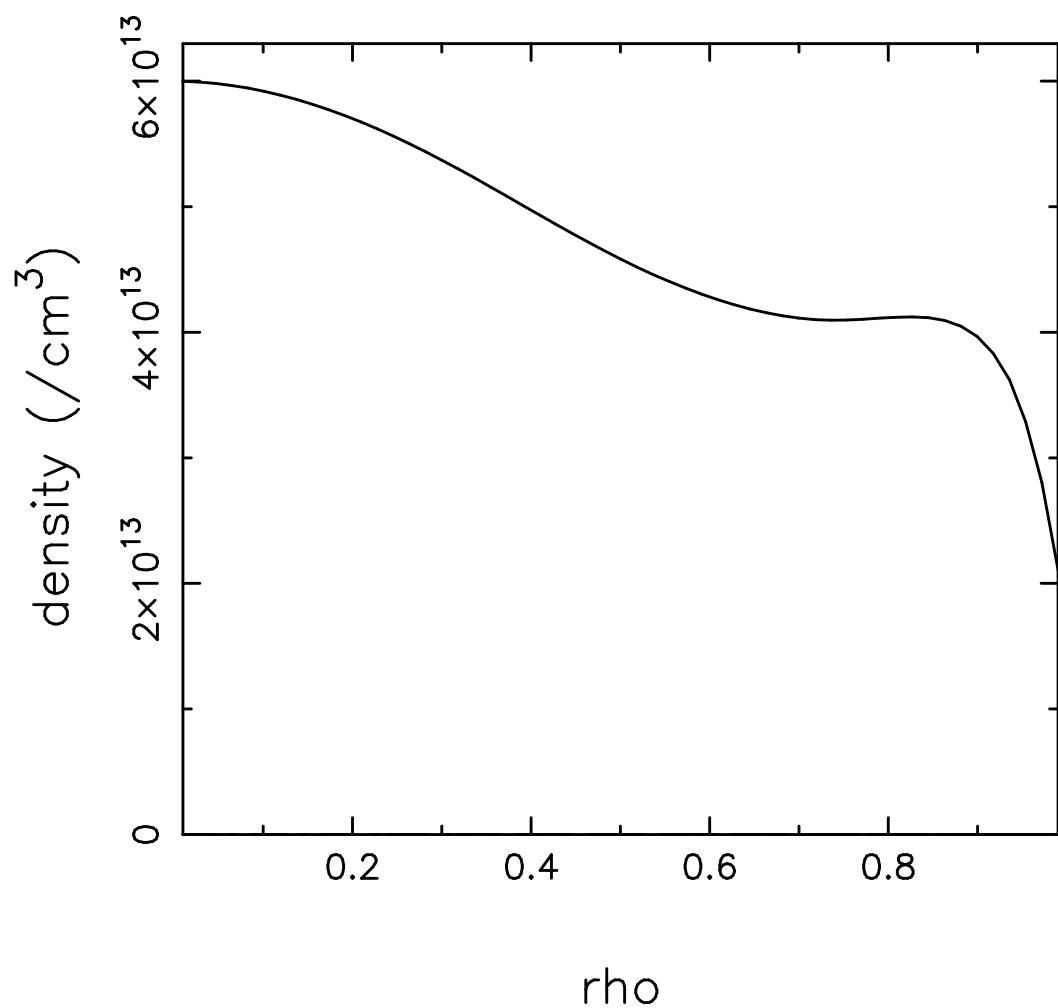
## DENSITIES (/CC) OF SPECIES

species no. 1 D general time step n= 200



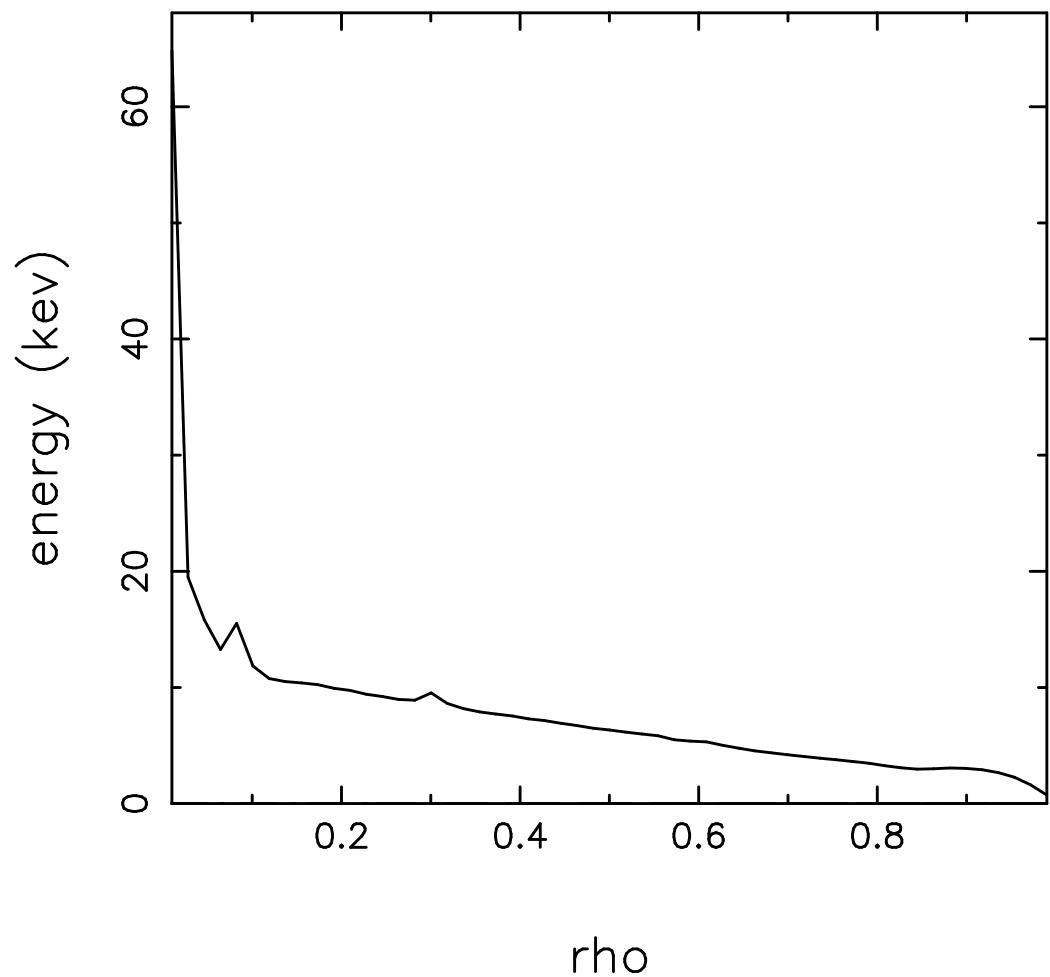
## DENSITIES (/CC) OF SPECIES

species no. 2 e general time step n= 200



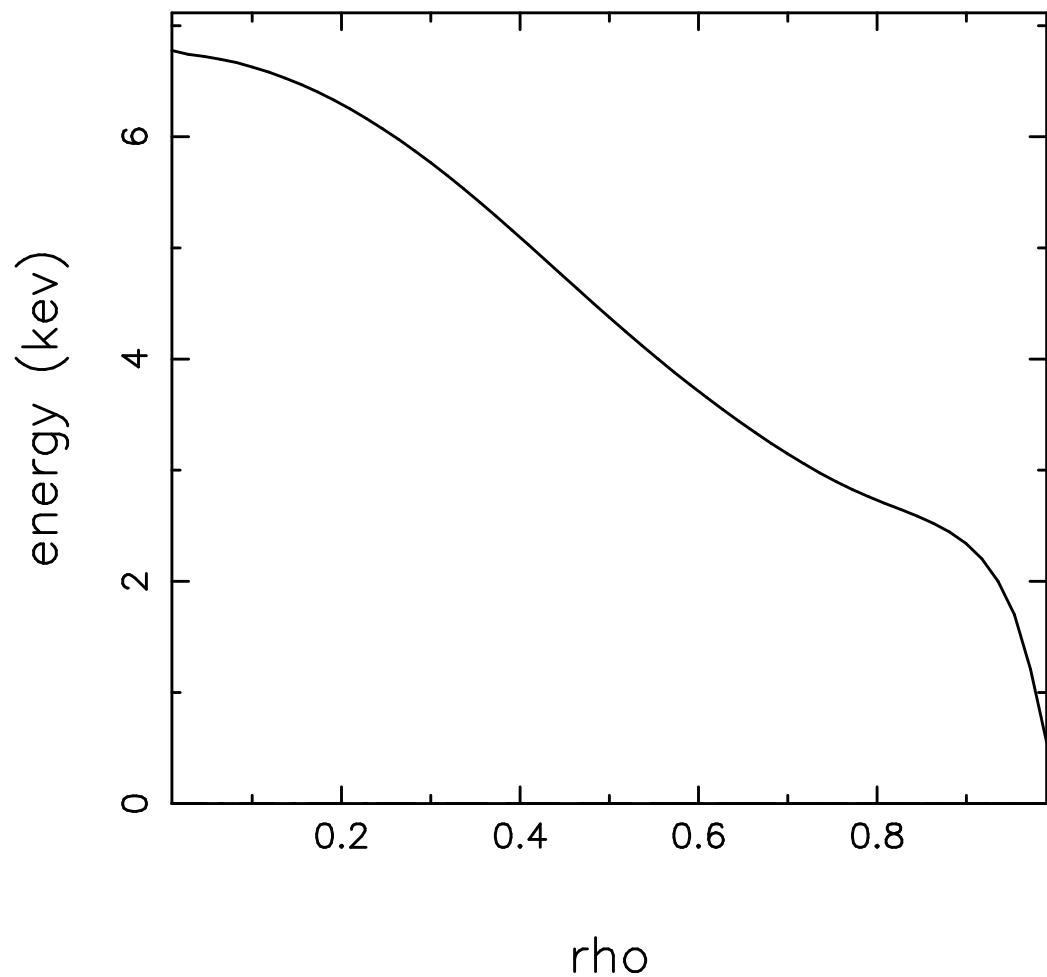
ENERGIES OF SPECIES IN KEV  
(Solid: <..>\_FSA)

species no. 1 D general time step n= 200



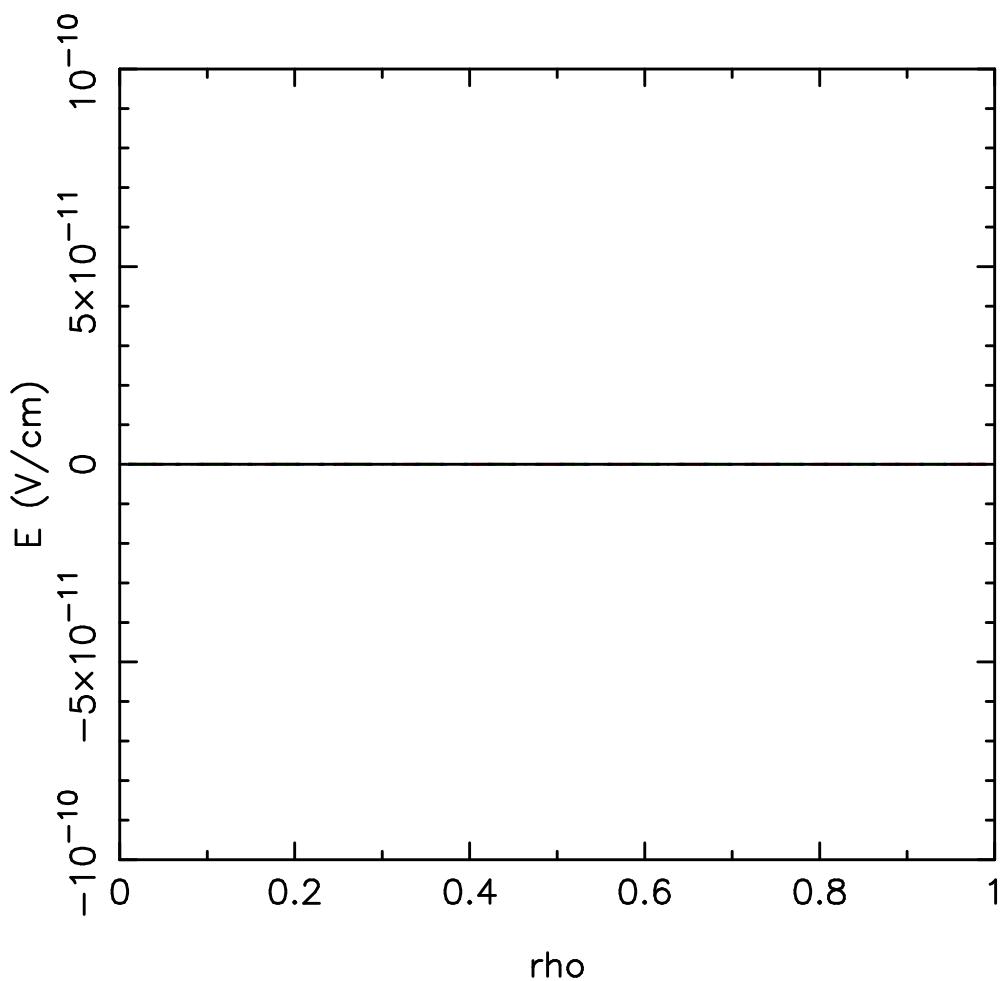
ENERGIES OF SPECIES IN KEV  
(Solid: <..>\_FSA)

species no. 2 e general time step n= 200



## Electric field (V/cm)

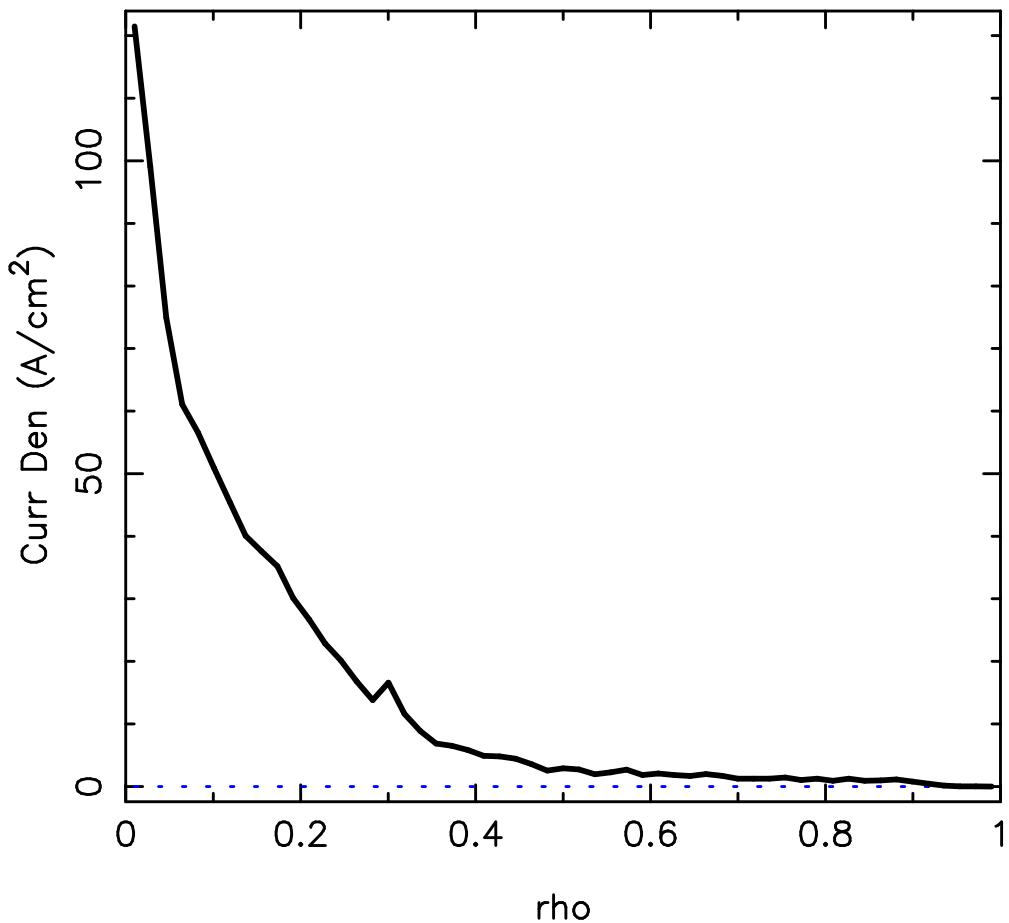
n= 1; t= 0.000000E+00sec  
n= 67; t= 3.660000E-01sec  
n= 133; t= 1.026000E+00sec  
n= 200; t= 1.696000E+00sec



## FLUX SURF. AV. CURNT. (AMPS/CM<sup>2</sup>)

Species: 1 Current from sum[curr\*darea]= 9.233387E+04 A

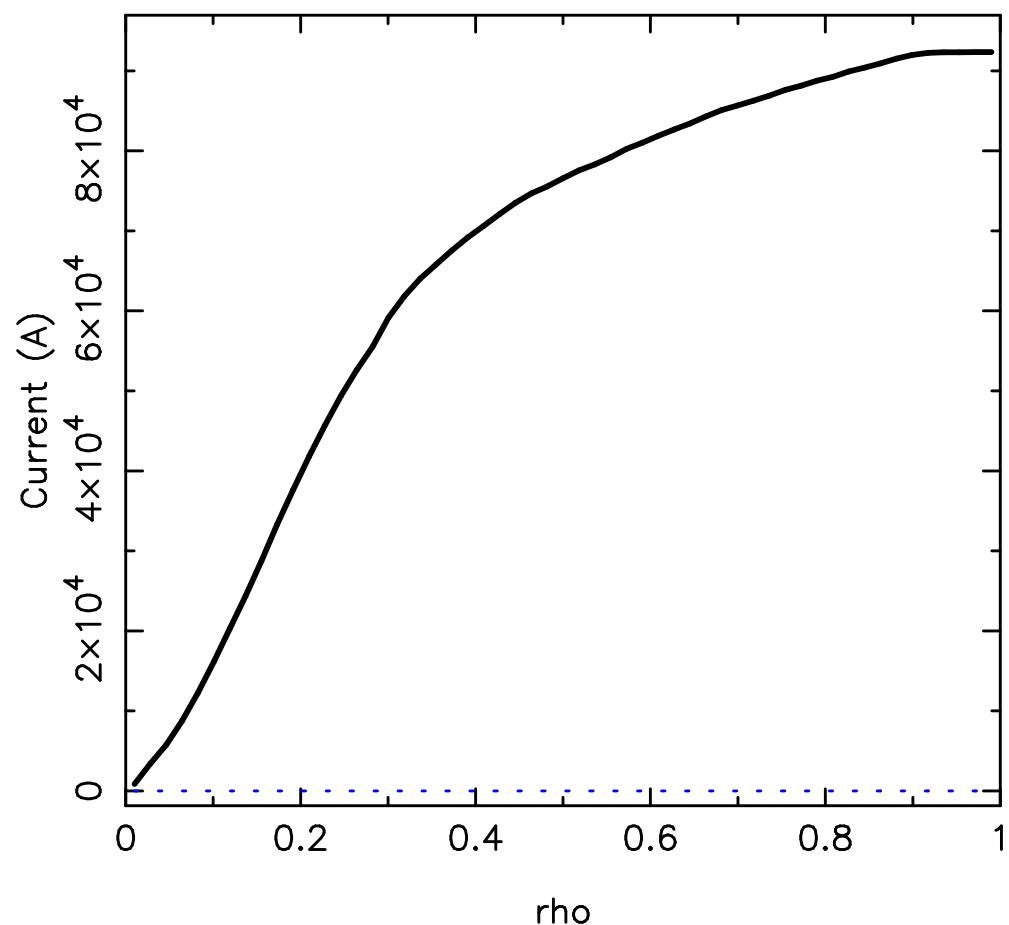
Blue/dotted: Bootstrap (fit model: bscurm() array) 0.000E+00A  
Solid/thin: Integral over f (curr() array) 9.233E+04A  
**Solid/bold: All the above together 9.233E+04A**



Current (A) INTEGRATED UP TO RHO or PSI

Species: 1 Current from sum[curr\*darea]= 9.233387E+04 A

Blue/dotted: Bootstrap (fit model: bscurm() array) 0.000E+00A  
Solid/thin: From Integral over f (curr()) 9.233E+04A  
**Solid/bold: From All the above together 9.233E+04A**



## FLUX SURF. AV. CURNT. (AMPS/CM<sup>2</sup>)

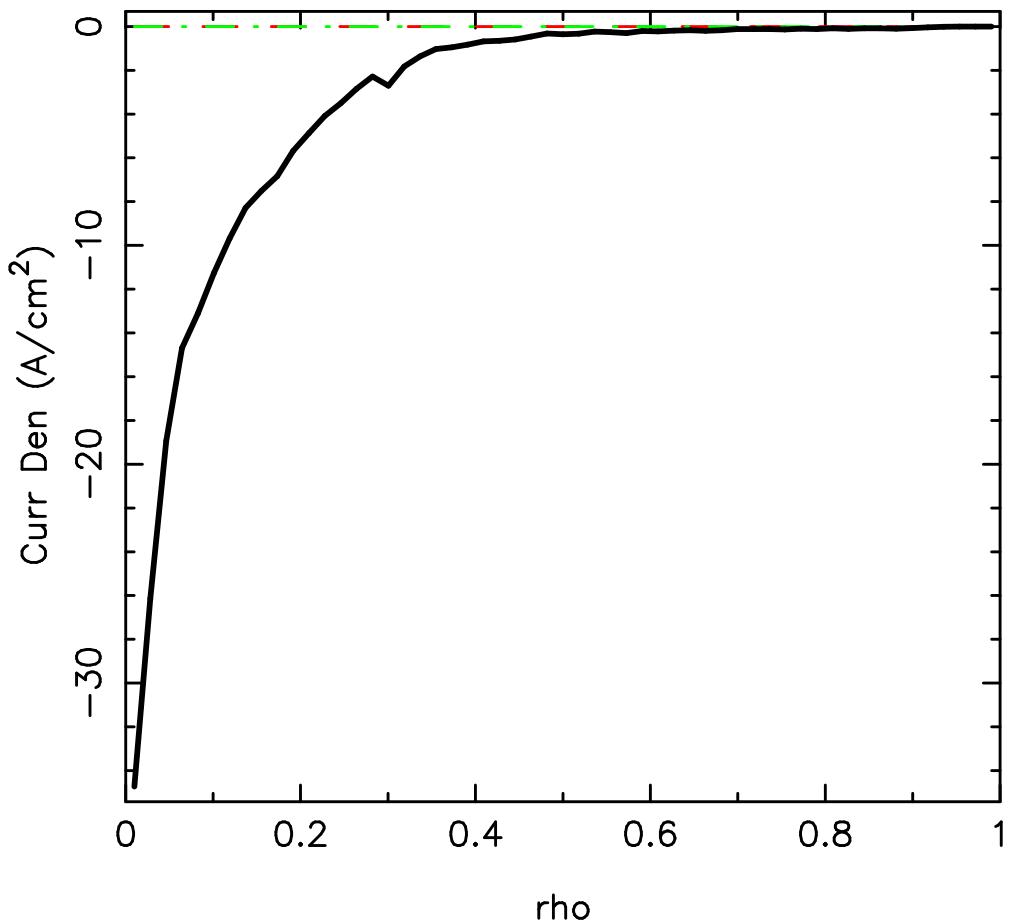
Species: 2 Current from sum[curr\*darea]= -1.598624E+04 A

Red-- (sigma\_coll\_neo-sigma\_banana)\*Ephi 0.000E+00A

Green-- Bootstrap (fit model: bscurm()) 0.000E+00A

Solid/thin: Integral over f (curr() array) -1.599E+04A

**Solid/bold:** All the above together -1.599E+04A



## Current (A) INTEGRATED UP TO RHO or PSI

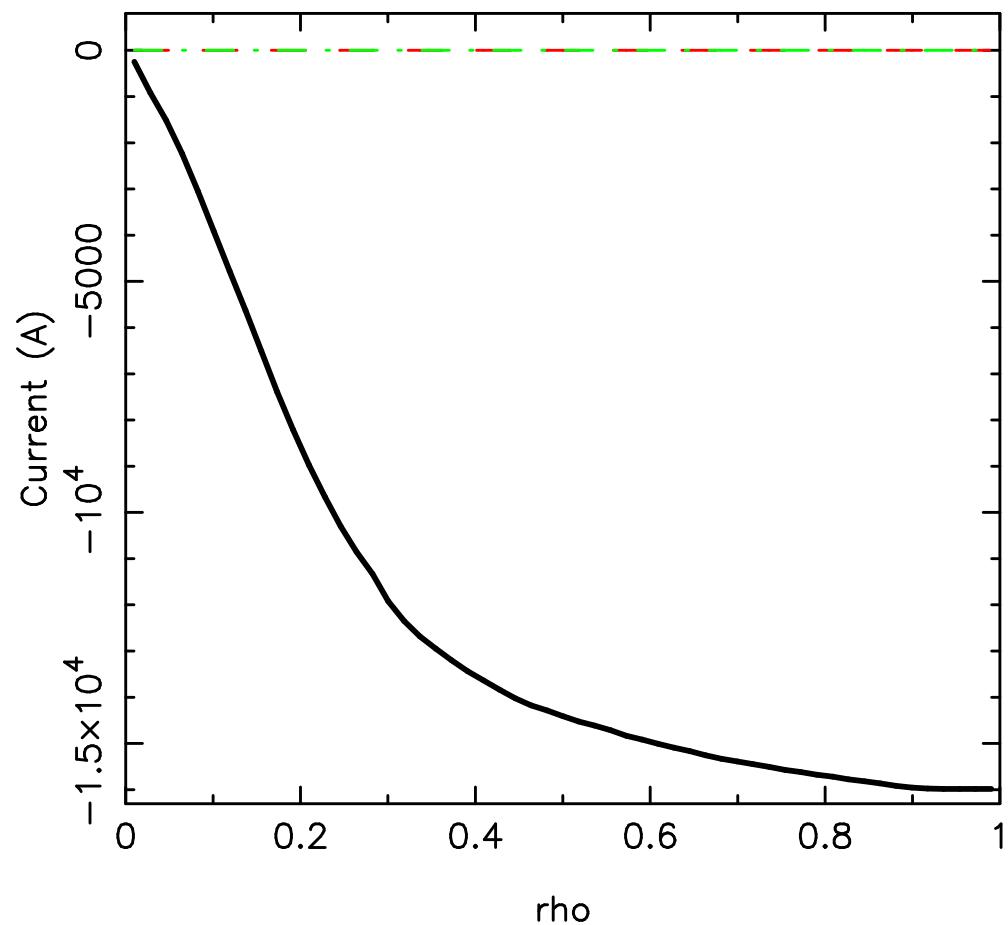
Species: 2 Current from sum[curr\*darea]= -1.598624E+04 A

Red--- ( $\sigma_{coll\_neo} - \sigma_{banana}$ )\* $E\phi$  0.000E+00A

Green--.Bootstrap (fit model: bscurm()) 0.000E+00A

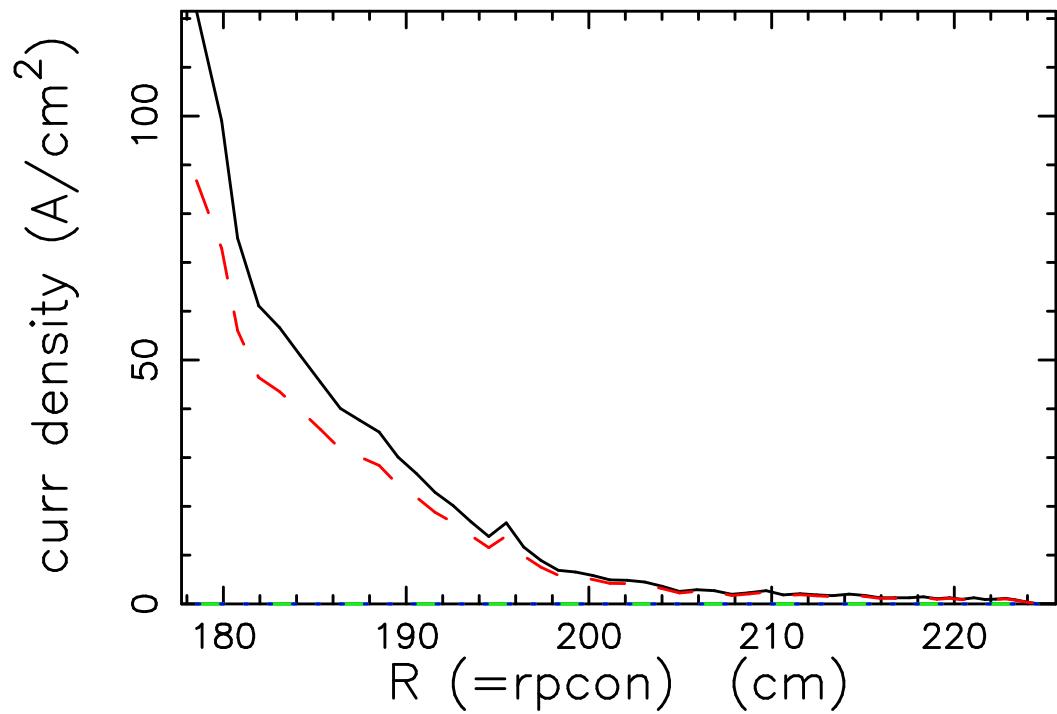
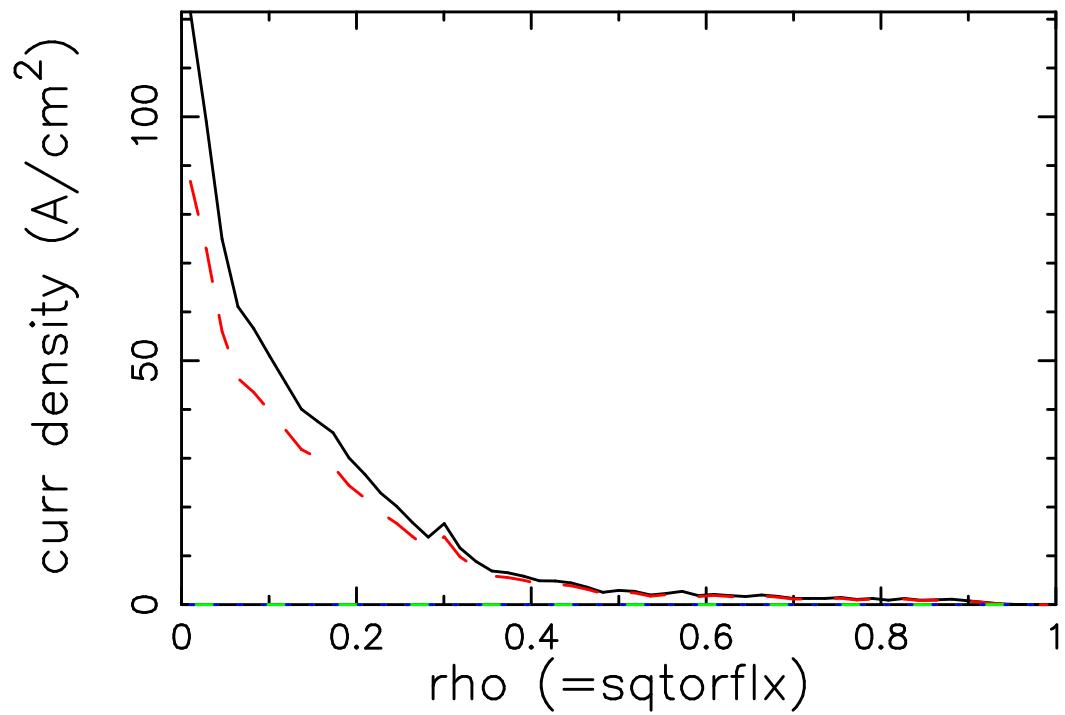
Solid/thin: From Integral over f (curr()) -1.599E+04A

**Solid/bold:** From All the above together -1.599E+04A



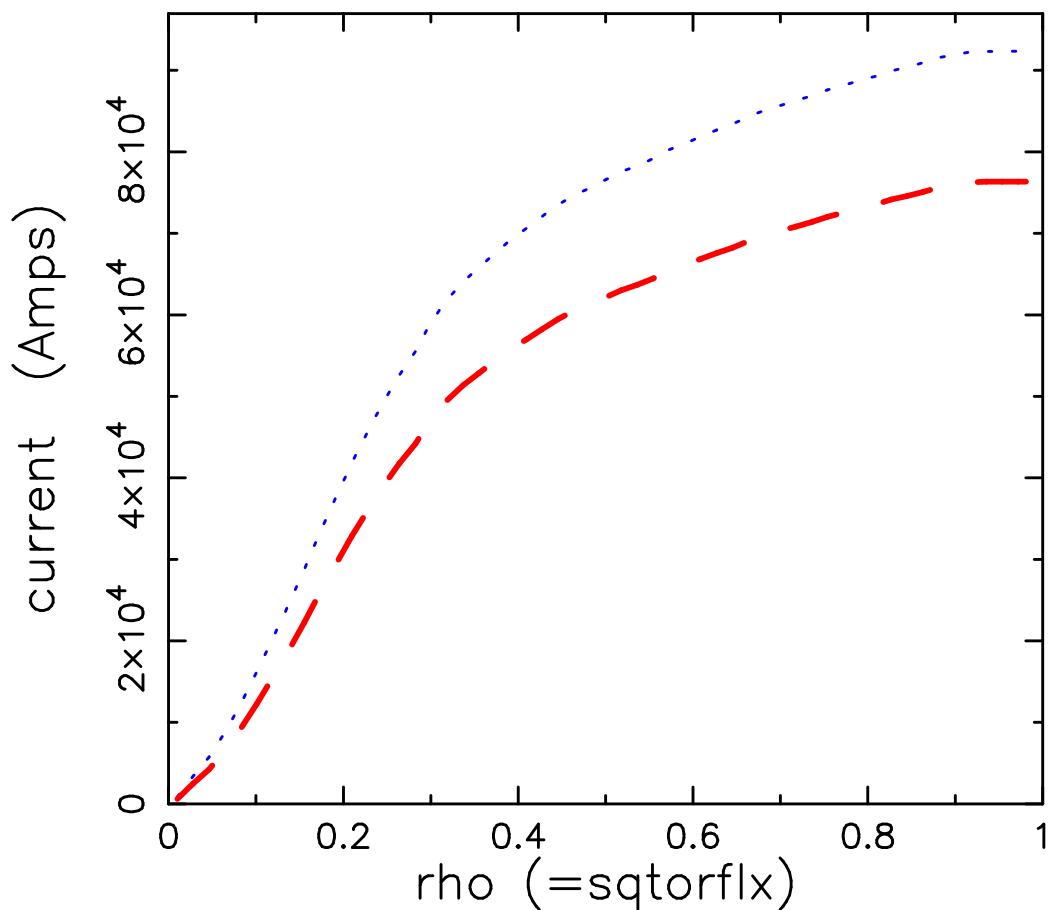
## CURRENT (AMPS/CM<sup>2</sup>)

fi [solid]= 9.233E+04      fi+e[---]= 7.635E+04  
bs\_e[---]= 0.000E+00      bs\_i[.....]= 0.000E+00 Amps



CURRENT (AMPS)  
(INTEGRATED UP TO RHO or PSI)

Blue/dotted: using currz(k,lr) over ionic general species  
Red/dashed: using curr(k,lr) over all general species



## SOURCE POWER: (WATTS/CC)

rho	NBI(orKO)+RF	NBI(or KO)	RF(1)	RF(2)	RF(3)
rho	(sorpwt)	(sorpw_nbi)	(sorpw_rf for gen.species 1,2,3)		
1.000E-02	7.198E+00	1.127E+00	6.071E+00	0.000E+00	
2.815E-02	2.255E+00	1.177E+00	1.078E+00	0.000E+00	
4.630E-02	1.728E+00	1.096E+00	6.325E-01	0.000E+00	
6.444E-02	1.344E+00	1.064E+00	2.805E-01	2.678E-15	
8.259E-02	2.174E+00	1.031E+00	1.143E+00	1.554E-08	
1.007E-01	1.237E+00	9.656E-01	2.718E-01	5.777E-09	
1.189E-01	9.360E-01	9.360E-01	1.139E-13	5.240E-11	
1.370E-01	8.679E-01	8.679E-01	-1.921E-36	6.709E-13	
1.552E-01	8.379E-01	8.379E-01	-2.430E-64	6.091E-15	
1.733E-01	8.026E-01	8.026E-01	-8.862E-104	3.153E-17	
1.915E-01	7.300E-01	7.300E-01	-5.229E-113	7.832E-20	
2.096E-01	6.839E-01	6.839E-01	-7.159E-88	7.955E-23	
2.278E-01	6.108E-01	6.108E-01	-1.677E-63	2.672E-26	
2.459E-01	5.727E-01	5.727E-01	-3.021E-41	2.361E-30	
2.641E-01	5.252E-01	5.252E-01	8.781E-20	1.818E-36	
2.822E-01	5.118E-01	4.945E-01	1.728E-02	0.000E+00	
3.004E-01	2.866E+00	4.687E-01	2.398E+00	0.000E+00	
3.185E-01	4.721E-01	4.336E-01	3.855E-02	0.000E+00	
3.367E-01	4.090E-01	4.090E-01	1.145E-11	0.000E+00	
3.548E-01	3.661E-01	3.661E-01	-2.026E-40	0.000E+00	
3.730E-01	3.509E-01	3.509E-01	-6.428E-82	0.000E+00	
3.911E-01	3.421E-01	3.421E-01	-3.244E-144	0.000E+00	
4.093E-01	3.123E-01	3.123E-01	-1.722E-77	0.000E+00	
4.274E-01	3.090E-01	3.090E-01	6.116E-29	0.000E+00	
4.456E-01	2.915E-01	2.912E-01	2.901E-04	0.000E+00	
4.637E-01	2.756E-01	2.709E-01	4.662E-03	0.000E+00	
4.819E-01	2.588E-01	2.588E-01	1.465E-06	0.000E+00	
5.000E-01	2.573E-01	2.573E-01	4.447E-36	0.000E+00	
5.181E-01	2.527E-01	2.527E-01	-2.278E-80	0.000E+00	
5.363E-01	2.466E-01	2.466E-01	-1.873E-60	0.000E+00	
5.544E-01	2.481E-01	2.481E-01	1.767E-13	0.000E+00	
5.726E-01	3.655E-01	2.378E-01	1.277E-01	0.000E+00	
5.907E-01	2.420E-01	2.245E-01	1.751E-02	0.000E+00	
6.089E-01	2.281E-01	2.281E-01	5.626E-10	0.000E+00	
6.270E-01	2.078E-01	2.078E-01	-5.396E-57	0.000E+00	
6.452E-01	1.902E-01	1.902E-01	-3.051E-129	0.000E+00	
6.633E-01	1.465E-01	1.465E-01	-5.093E-239	0.000E+00	
6.815E-01	1.104E-01	1.104E-01	0.000E+00	0.000E+00	
6.996E-01	9.880E-02	9.880E-02	0.000E+00	0.000E+00	
7.178E-01	9.527E-02	9.527E-02	0.000E+00	0.000E+00	

7.359E-01	8.302E-02	8.302E-02	0.000E+00	0.000E+00
7.541E-01	6.015E-02	6.015E-02	0.000E+00	0.000E+00
7.722E-01	3.716E-02	3.716E-02	0.000E+00	0.000E+00
7.904E-01	2.421E-02	2.421E-02	0.000E+00	0.000E+00
8.085E-01	1.648E-02	1.648E-02	2.387-298	0.000E+00
8.267E-01	2.269E-02	2.269E-02	5.776-176	0.000E+00
8.448E-01	1.630E-02	1.630E-02	2.134E-87	0.000E+00
8.630E-01	1.795E-02	1.795E-02	3.076E-28	0.000E+00
8.811E-01	2.030E-02	2.030E-02	5.704E-07	0.000E+00
8.993E-01	1.651E-02	1.644E-02	6.468E-05	0.000E+00
9.174E-01	1.587E-02	1.587E-02	2.351E-07	0.000E+00
9.356E-01	7.899E-03	7.899E-03	9.480E-39	0.000E+00
9.537E-01	1.434E-03	1.434E-03	1.333-141	0.000E+00
9.719E-01	2.014E-03	2.014E-03	0.000E+00	0.000E+00
9.900E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Power integr.over rad. (RF+NBI(or KO), all gen.species)= 4.6531E+06Watts  
 Power from NBI(or KO) (sorpw\_nbii)= 3.7826E+06Watts  
 Power from RF (sorpw\_rfi) Gen.species no.1 = 8.7052E+05Watts  
 Power from RF (sorpw\_rfi) Gen.species no.2 = 1.5784E-03Watts

### DEPOSITED POWER: (WATTS/CC)

0.736	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.754	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.772	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.790	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.809	0.24-297	0.24-297	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.827	0.58-175	0.58-175	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.845	0.22E-86	0.22E-86	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.863	0.35E-27	0.35E-27	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.881	0.58E-06	0.58E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.899	0.21E-04	0.21E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.917	0.14E-06	0.14E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.936	0.88E-38	0.88E-38	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.954	0.20-141	0.20-141	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.972	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.990	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

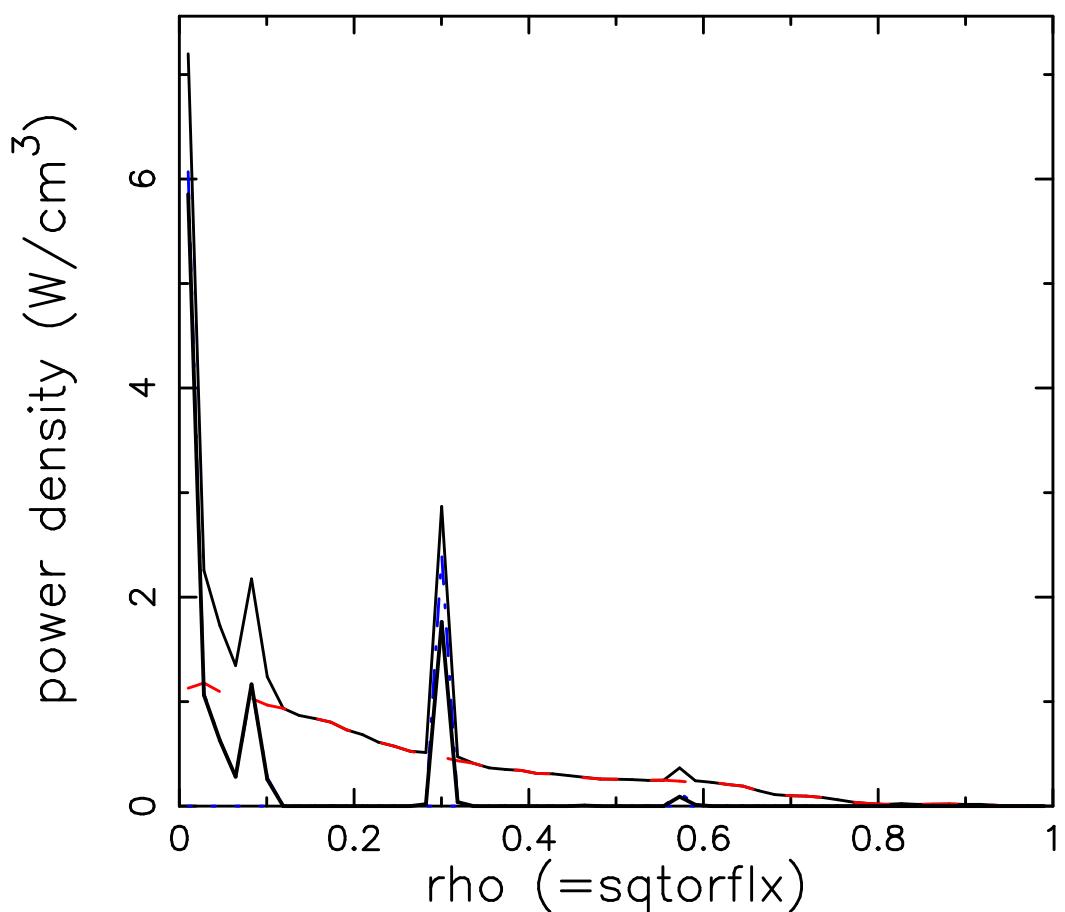
Power sources integr. over rad. (RF+NBI, all gen.species)= 4.6531E+06W  
 Power from intern ray diagnostic[powurf(0)]= 6.9803E+05W

mode/harmonic krf, nharm(krf), powurf(krf)=	1	5	1.1551E+01
mode/harmonic krf, nharm(krf), powurf(krf)=	2	6	4.3127E+04
mode/harmonic krf, nharm(krf), powurf(krf)=	3	7	4.3602E+05
mode/harmonic krf, nharm(krf), powurf(krf)=	4	8	2.1714E+05
mode/harmonic krf, nharm(krf), powurf(krf)=	5	9	1.7372E+03
mode/harmonic krf, nharm(krf), powurf(krf)=	6	0	1.5830E-03

Power by collisions (from ray data) = 0.0000E+00W

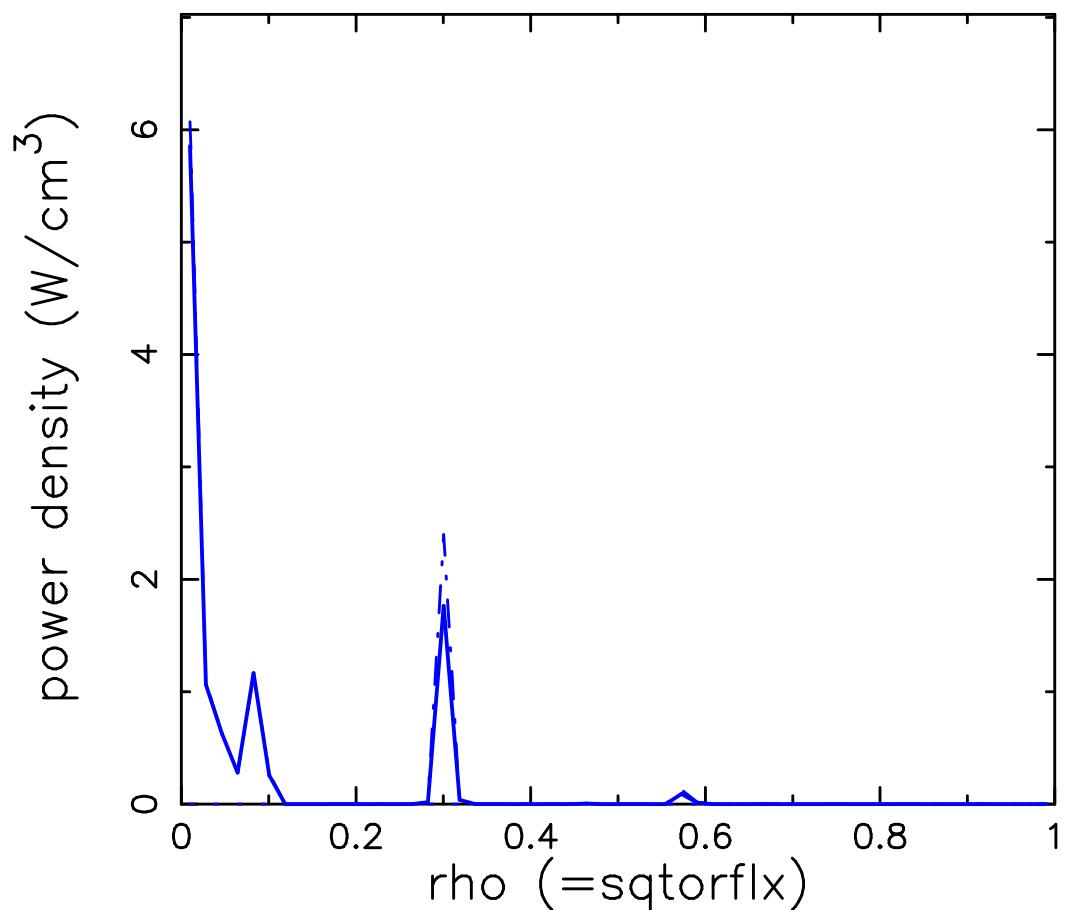
Power by linear damping (from ray data)= 0.0000E+00W

FSA SOURCE POWER DEN: (WATTS/CM<sup>3</sup>)  
 Solid: NBI(or KO)+RF for all gen.sp.[sorpwt]  
 Dashed: NBI (or KO) [sorpw\_nbi]  
 Solid-bold: total absorbed RF power [powrft]  
 Other: RF general species (each) [sorpw\_rf]

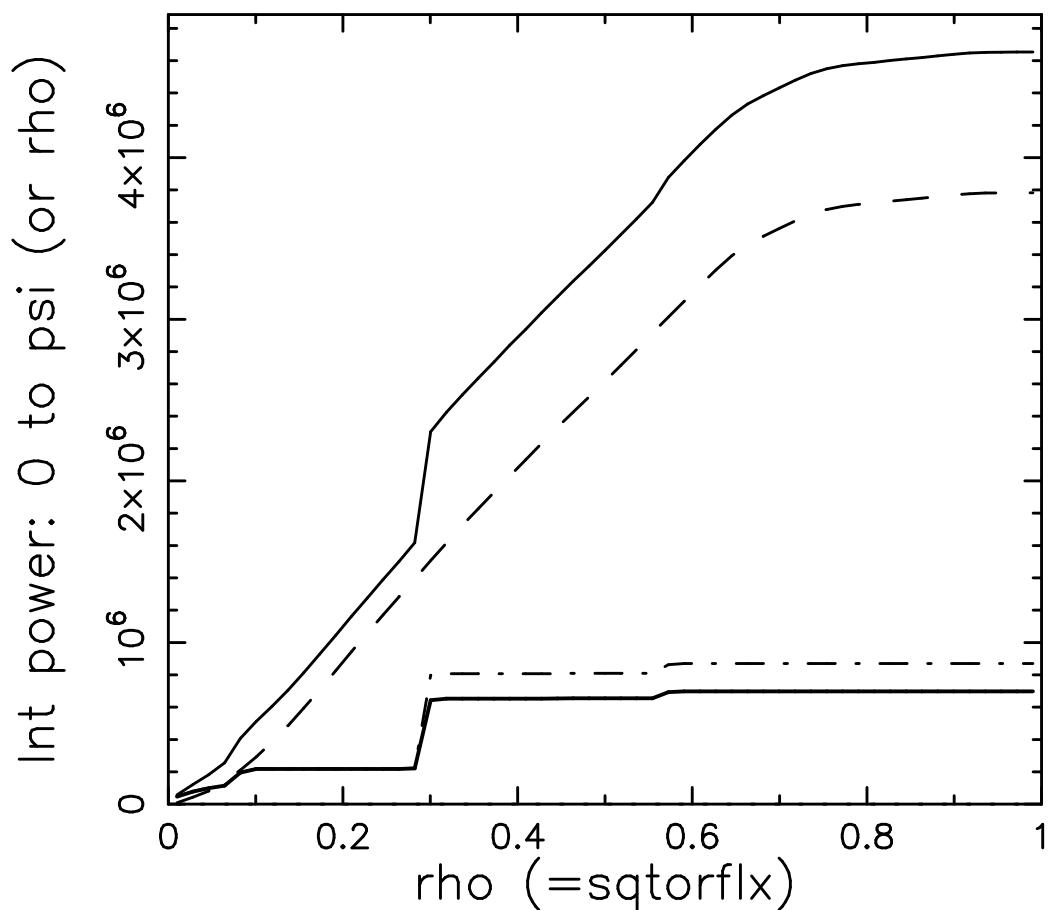


FSA RF POWER DEN: (WATTS/CM<sup>3</sup>)

Solid—bold: total absorbed RF power [powrft]  
Other: RF general species (each) [sorpw\_rf]



SOURCE POWER (integr. up to rho or psi) (WATTS)  
 Solid: NBI(or KO)+RF for all gen.sp.[sorpwti]  
 Dashed: NBI(or KO) [sorpw\_nbii]  
 Solid-bold: total absorbed RF [powurfi(\*,0)]  
 Other: RF general ions (each) [sorpw\_rfi]



## RF POWER (integr. up to rho or psi) (WATTS)

Solid—bold: total absorbed RF [powurfi(\*,0)]  
Other: RF general species (each) [sorpw\_rfi]

