**Some Comments on the OEDGE/DIVIMP Input file**

The following sample input file has had some of the important lines high-lighted. In addition, in many cases, some text has been added to explain why or in what circumstances the high-lighted lines are most important. Keep in mind that, depending on the objectives of the simulation, any number of the inputs may be important. The following document high-lights those that are most often important.

Comments are placed after the highlighted lines.

'+A01 Ref DIV Title' 'EAST TESTCASE 41595 A3'

'+A02 Run comment ' 'EAST TESTCASE - setup for new grid - SOL22 - (RING 43 has a problem with SOL22 - piece wise plasma used) - add in Tungsten imourity '

'+A03 Equil File Name' 'grid\_east\_41595'

* The first three lines of the file contain documentation and descriptions of the file. The first line is used as part of the title of all plots produced by the OUT program so it should be short and descriptive. The second line contents are transcribed to the beginning of the .dat file and are a record of what was most important about this inpur file. The third line records the name of the grid file used for the case.

$

$

$ ======================================================================

$ OSM OPTIONS

$ ======================================================================

$

$ I/O:

$ ======================================================================

$

'{F LOG} General purpose log file 0-nominal 1- ' 2

$

'{GRID FILE} File name of the fluid grid to be loaded' 'fort.4' $ OPT%F\_GRID\_FILE

'{GRID STRIP CELLS} Remove boundary cells from SONNET grid ' 0 $ OPT%F\_GRID\_STRIP

'{GRID FORMAT} 1-SONNET 2-OSM ' 2 $ OPT%F\_GRID\_FORMAT

$

$ Plasma specification:

$ ======================================================================

$

$'{SOL APPLICATION} 1.0'

$ Tube1,2 Solver

$ 1 999 28

$

$'{089} 1.0 Inner target surface data:'

$ R(m) Te Ti Jsat/Ne Ring1,2

$ -1.0 1.0 999.0 0.0

$ -2.0000 5.0 5.0 1.0E+01

$ 2.0000 5.0 5.0 1.0E+01

$

$'{088} 1.0 Outer target surface data:'

$ R(m) Te Ti Jsat/Ne

$ -1.0 1.0 999.0 0.0

$ -2.0000 5.0 5.0 1.0E+01

$ 2.0000 5.0 5.0 1.0E+01

$

$'{S74} 4.1 Midstream interpolation data:'

$ ----------radial----------- ---parallel--- -------------------plasma-------------------

$ Type Tubes Mode Crd Exp x y Mode Exp Set ne v/M pe Te Ti V

$ (m-3) (m s-1) (eV m-3} (eV) (eV) (V)

$ Outer midplane

$ 2.0 1 99 4 5 1.0 1 0.0 2

$ 'thomson.dat' 1 0.0 1.0 0.0 0.0 1.0 1.0 0.0

$ 0.0 0.8000 0.0000 4.0 0.0 0.0 5.0 5.0 0.0

$ 0.0 0.9500 0.0000 4.0 0.0 0.0 5.0 5.0 0.0

$

$ Eirene setup:

$ ======================================================================

$

$'{E NEUTRAL SOURCES} 1.0 Recycling, gas puffing, and neutral beam injection:'

$ Type NPTS Flux Frac Spe Ind E(eV) TARGET IND1 2 Note

$--------------------------------------------------------------------------------------------------

$ 1.0 2 -999.0 1.0 4 1 0.0 1 'inner target'

$ 1.0 2 -999.0 1.0 4 1 0.0 2 'outer target'

$ COS MAX POSX Y Z VECX Y Z

$ ----------------------------------------------

$ 3.0 -90000 2.82E+2 1.0 2 1 0.038 1.0 90.0 0.9250 0.0001 0.0001 1.0 0.0 0.0 'outer midplane puff'

$

$

'{EIR VOID GRID} 1.0 Triangle grid setup for the zones outside the fluid grid:'

$ Zone FIND1,2 WIND1,2 AIND1,2 Res. HOLEX,Y CODE ne Te Ti

$-------------------------------------------------------------------------

-1 2 999 -1 -1 -1 -1 0.1 -1.0 -1.0 -1 0.0 0.0 0.0 $ default

$

$

'{EIR TET DUMP} Surface reflection model for the tororidal end surfaces' 2 $ 2=absorbing, 1=reflecting

$

$

'{EXIT}'

* The entire block ion Orange is related to SOL28/OSM. This block will be more usable when documentation for this option is available.
* The three lines marked in red are REQUIRED for use of grids created by the fuse grid generator. DG-Carre grids do not need this input block.

$

$ EIRENE options:

$ ======================================================================

$

'{E NEUTRAL SOURCES} Recycling, gas puffing and neutral beam injection:'

$

$ To limit the neutral source to particular target segments, have a look at the first plot

$ from d-mcr.d6o and zoom in on the targets to get the ring indices of interest. Then

$ deactivate the volume recombination source listed below by setting NPTS=2 and FLUX=-999.0.

$ Also make sure there are no gas puffs active. Then go to input block \*080 below, and

$ set as follows:

$

$ '\*080 2.0 Step option value over-rides:'

$ ' ' ' (dummy line) '

$ 'Step Start End Region ' 2

$ -2.0 2.0 0.0 0.0 0.0 0.0 0.0 This line is needed to suppress recycling everywhere.

$ -1.0 23.0 27.0 2.0 0.0 0.0 0.0 This line turns it back on for rings 23-27, outer

$ $ -1.0 41.0 50.0 2.0 0.0 0.0 0.0 target (REGION=2). Yes, REGION=1 for the inner target

$ to be on and REGION=3 for both targets. You can have

$ any lines here as you like.

$

$ If you want to look at the volume recombination source only, then set NPTS=2 and FLUX=-999.0

$ for both the inner and the outer targets.

$

$ For gas puffs, uncomment the last line in the input block below. If you want everything

$ else off just do the NPTS=2, FLUX=-999.0 trick for the recycling and volume recombination

$ sources (and not have to worry about \*080 for recycling). Inputs:

$

$ FLUX - particles puffed - in AMPS

$ FRAC - source scaling - leave at 1.0

$ SPE - puffed species - 1=D, 2=D2, 3=test ions (not in use), 4-D and D2 depending on the plasma (sorted in EIRENE)

$ IND - 1 - not currently in use

$ E - launch energy - monoenergetic

$ COS - distribution - 0.0-isotropic, 1.0-cosine

$ MAX - angular limit - 0.0-straight line, 90.0 - 90 degree spread (or 180, not sure)

$ POSX,Y,Z - poistion of the puff

$ VECX,Y,Z - unit normal - VECX=1.0 points inward, and VECY=1.0 points downward (I think)

$

$ You can check what the puff is doing with the neutral particle track plots at the end

$ of d-mcr.d6o, but only 20 tracks are stored at the moment (not user-specifiable at

$ present, sorry).

$

$ To change the time spent in EIRENE, just adjust EIRTIME below.

$

$ I suggest checking the EIRENE output file every once in a while. If you search for IPANU

$ you get the number of histories for each stratum/source, and FLUXT tells you the flux

$ strength in Amps.

$

$

$Type NPTS Flux Frac Spe Ind E(eV) TARGET IND1 2 Note

$-----------------------------------------------------------------------------------------------

1.0 -90000 1.0 1.0 4 1 0.0 1 'inner target'

1.0 -90000 1.0 1.0 4 1 0.0 2 'outer target'

2.0 -90000 1.0 1.0 4 1 0.0 'volume recombination'

* These lines specify the deuterium/hydrogen sources that are included in any EIRENE simulation that is run from OEDGE for this case. Usually these inputs are NOT changed. The most likely edit in this section might be the addition of a deuterium/hydrogen puff to the EIRENE simulation which can be described by the lines below.

$ COS MAX POSX Y Z VECX Y Z

$ ------------------------------------------

$ 3.0 -90000 1.0E+3 1.0 2 1 0.038 1.0 90.0 1.41 -1.346 0.0 1.0 0.0 0.0 'duct puff'

$

$ 3.0 -90000 1.0E+3 1.0 2 1 0.038 1.0 90.0 2.353 0.0 0.0 1.0 0.0 0.0 'omp puff'

$ 3.0 -90000 1.0E+3 1.0 2 1 0.038 1.0 90.0 1.02 0.0 0.0 -1.0 0.0 0.0 'imp puff'

$ 3.0 -90000 1.0E+3 1.0 2 1 0.038 1.0 90.0 1.3 1.3 0.0 0.0 1.0 0.0 'top puff'

$ 3.0 -90000 1.0E+3 1.0 2 1 0.038 1.0 90.0 1.35 -1.365 0.0 0.0 -1.0 0.0 'pfz puff'

$ ------------------------------------------

$ 3.0 -90000 1.0E+0 1.0 2 1 0.038 1.0 0.0 2.15 -0.8 0.0 1.0 0.0 0.0 'lower outboard puff'

$

$ 1.0 2 -999.0 1.0 4 1 0.0 1 'inner target'

$ 1.0 2 -999.0 1.0 4 1 0.0 2 'outer target'

$ 2.0 2 -999.0 1.0 4 1 0.0 'volume recombination'

$ COS MAX POSX Y Z VECX Y Z

$ --------------------------------------------

$ 3.0 -90000 1.0E+3 1.0 2 1 0.038 1.0 90.0 1.35 -1.362 0.0 0.0 -1.0 0.0 'pfz puff'

$

$

'{EIR VOID GRID} 1.0 Triangle grid setup for the zones outside the fluid grid:'

$ Zone FIND1,2 WIND1,2 AIND1,2 Res. HOLEX,Y CODE ne Te Ti

$-------------------------------------------------------------------------

-1 2 999 -1 -1 -1 -1 0.1 -1.0 -1.0 -1 0.0 0.0 0.0 $ DEFAULT

$

$

'{EXIT}'

$

$

$ ======================================================================

$ DIVIMP OPTIONS

$ ======================================================================

$

'\*080 2.0 Step option value over-rides:'

' ' ' (dummy line) '

'Step Start End Region ' 0

$ -2.0 2.0 0.0 0.0 0.0 0.0 0.0 SUPPRESSING TARGET FLUXES IN EIRENE

$ -1.0 23.0 27.0 2.0 0.0 0.0 0.0 UPPER, INNER BAFFLE RECYCLING ONLY

$

$

$'\*063 I flex 2 ( 30-parabolic low Te region at targ)' 31 STOPOPT2

$'\*064 I flex 3 ( 14-zero additional cell data) ' 14 STOPOPT3

$'\*066 I flex 4 ( 30-SOL22 output on) ' 30 IFLEXOPT(4) (0)

$'\*008 Screen output 0-quiet 1-talkative 2-verbose ' 0

$

'\*028 Minimum poloidal side length (m) ' 0.0020 GRD\_MINPL

$

$

$ jdemod - turn off grdnmod by commenting this out even though the line does not

$ specify any grid modifications it does turn on some code

$

'\*G37 1.0 Grid manipulation:' GRDMOD

' ' ' (dummy line) '

'Type Mode Refinement Range1 Range2 ' 1

0.0 0.0 0.0 0.0 0.0

$

$ Relaxation options:

'\*030 Relaxation option 0-OFF 1-N/A 2-BC 3-N/A ' 0 REL\_OPT

* This should be OFF=0 for most simulations.

'\*031 PIN source relaxation fraction ' 1.0 REL\_FRAC \*PS\*

'\*034 Number of steps for BC relaxation ' 1 REL\_NSTEP 10

'\*035 Number of iterations at each step ' 3 REL\_NITER 5

'\*036 Pace setting for BC relaxation ' 1.0 REL\_PACE

'\*045 Region for boundary values ' 0.0 0.0 REL\_BOUND1,2

'\*086 Reset PIN sources at the beginning of each step' 0 RELRESET (0)

'\*044 Index of stored solution to be loaded ' -1 10 OSM\_STORE

'\*041 Rings to monitor ' 18 18 OSM\_WATCH1,2

$

$'\*088 0.0 Outer (JET inner) target data for interpolation: '

$' ' ' (dummy line) '

$' PSIN Te Ti Jsat/Ne' 3

$ -1.0 1.0 99.0 0.0

$ 0.8000 10.0 10.0 1.0E+04

$ 2.0000 10.0 10.0 1.0E+04

$'\*089 0.0 Inner (JET outer) target data for interpolation: '

$' ' ' (dummy line) '

$' PSIN Te Ti Jsat/Ne' 3

$ -1.0 1.0 99.0 0.0

$ 0.8000 10.0 10.0 1.0E+04

$ 2.0000 10.0 10.0 1.0E+04

$

$ Puffing:

'\*E16 1.2 EIRENE neutral puffing surface data:'

' ' ' (dummy line) '

'Mode Amount Surface Cell T1 T2 Type E (eV)' 0 EIRNPUFF (0)

$ 4.0 100.00 106.0 162.0 0.50 0.60 1.0 8.000

$ 4.0 100.00 88.0 -1.0 0.10 0.20 1.0 8.000

$ 4.0 100.00 88.0 3.0 0.54 0.55 1.0 8.000

$

$ EIRENE options:

'\*026 PIN selection 0-NIMBUS 2-EIRENE99 4-EIRENE04 ' 5 PINCODE (1)

* PIN option set to 5 for eirene07 – should always be set to this value for most cases

'\*010 Geometry data 0-standard 1-from DIVIMP ' 1 EIRGEOM

'\*021 Input file 0-standard 1-from DIVIMP ' 1 EIRDATA

'\*020 Run time (CPU seconds) ' 30 EIRTIME

'\*E17 Number of EIRENE self-iterations ' 0 EIRNITER (1)

'\*022 Material: target 1-Mo 2-C 3-W 4-Be ' 2 EIRMAT1

'\*024 wall ' 2 EIRMAT2

* You may want to set the above values to the appropriate surface material for your simulations

'\*011 Grid type 0-structured 1-generalized ' 1 EIRGRID

'\*018 Wall data 0-standard 1-seamless ' 1 EIRNEUT

'\*019 Debug option 0-off ' 0 EIRDEBUG

'\*E11 n-n collisions 0-off 1-standard mesh ' 0 EIRBGK (0)

'\*E12 Lyman alpha opacity 0-off 1-rec 2-rec&ion ' 0 EIROPACITY (0)

'\*E14 CX D2+ production 0-off 1-Dalpha only 2-full ' 2 EIRCXD2 (0)

'\*E26 Fujimoto D2+ rates 0-off 1-on ' 1 EIRFUJI (0)

'\*E15 Proton-D2 collisions 0-off 1-on ' 1 EIRPH2 (0)

'\*E39 TRIM database in EIRENE (0-off, 1-on) ' 1 EIRTRIM (0)

'\*E21 Range for EIRENE particle track output ' 1 1

'\*E27 EIRENE CPU-time weight between NPTS and FLUX ' 1.0 EIRALLOC ( 1.0)

$

$

$ The pressure gauges are represented in EIRENE by toroidal

$ cylinders. Their geometry is specified as follows:

$

$ Y0 (m) - x coordinate of the center of the poloidal

$ cross-section (R space in DIVIMP)

$ Y0 (m) - y coordinate (Z space in DIVIMP)

$ TOR (degrees) - toroidal location (not in use as the cylinders

$ are toroidally continuous at the moment)

$ RAD (m) - cylinder radius

$ LEN - length of cylinder (not in use)

$

$ Other input:

$

$ CODE - Pressure gauge designation for use in DIVIMP

$ output. For DIII-D:

$ 101.0 PBF1 pump chamber

$ 102.0 PBF2

$ 103.0 PBF3

$ 104.0 PV1 PFZ

$ 105.0 PR2 above baffle

$ 106.0 VPLOWS midplane

$ 107.0 PCM105BAF

$ 108.0 PCM240TOR

$ P (mTorr) - Experimental pressure measurement for use in

$ DIVIMP output.

$

$'\*058 1.1 Pressure gauge specification:'

$' ' ' (dummy line) '

$' Code x0(m) y0(m) tor(deg) rad(m) len p(mTorrd)' 2 EIRNPGDAT

$ 106.0 2.200 -0.700 0.0 0.02 0.0 0.033

$ 106.0 2.650 -0.900 0.0 0.04 0.0 0.033

$

$

$ In order for EIRENE to include vessel structures that are attached to

$ the main chamber "through" target segments (the pump chamber on

$ DIII-D for example), the default surface options in the EIRENE input file

$ must be changed for these target segments. The following input list allows

$ the EIRENE options for selected surfaces to be specified (only applies

$ when DIVIMP is used to write the EIRENE input file -- see DIVIMP

$ option EIRDATA).

$

$ TYPE - Type of surface (in DIVIMP):

$ 1.0 - target segment

$ 2.0 - wall segment (not yet implimented)

$ INDEX - For TYPE = 1.0:

$ The ring number that the target segment is on.

$ If 'index' is < 0, then the low cell index

$ target is modified (outer target for JET; inner target for

$ C-MOD, DIII-D), otherwise it is the high cell index target.

$ For TYPE = 2.0:

$ Index of the wall segment in the xVESM arrays.

$ ILIIN - see EIRENE manual

$ ILSIDE -

$ IKSWCH -

$ TRANSP1 -

$ TRANSP2 -

$

'\*076 1.0 Surface properties:'

' ' ' (dummy line) '

' Type Index ILIIN ILSIDE ILSWCH TRANSP1 TRANSP2 ' 0

$ 1.0 20.0 -1.0 0.0 020010.0 99.0 99.0

$ 1.0 21.0 -1.0 0.0 020010.0 99.0 99.0

$ 1.0 22.0 -1.0 0.0 020010.0 99.0 99.0

$ 1.0 23.0 -1.0 0.0 020010.0 99.0 99.0

$

$

'\*079 1.0 Plasma data for uniform private flux zone:'

' ' ' (dummy line) '

' Ring Region Te (eV) Ti (eV) ne (m-3) v (m s-1)' 0 OSMPPV

$ 26.0 3.0 3.5 3.5 0.7E+19 0.0

$ 27.0 3.0 3.5 3.5 1.0E+19 0.0

$ 28.0 3.0 3.5 3.5 1.0E+19 0.0

$ 29.0 3.0 3.5 3.5 2.0E+19 0.0

$ 30.0 3.0 7.0 7.0 3.5E+19 0.0

$ 31.0 3.0 15.0 15.0 3.5E+19 0.0

$ 32.0 3.0 16.0 16.0 3.5E+19 0.0

$ 33.0 3.0 19.0 19.0 3.5E+19 0.0

$

'\*088 0.0 Outer (JET inner) target data for interpolation: '

' ' ' (dummy line) '

' R-Rsep Te Ti Jsat/Ne' 12

-1.0 1.0 999.0 0.0

0.90 2.0 2.0 1.0e3

0.99 20.0 20.0 1.0e5

1.00 100.0 100.0 5.0e5

1.01 80.0 80.0 4.0e5

1.02 70.0 70.0 3.0e5

1.03 60.0 60.0 2.0e5

1.04 50.0 50.0 1.0e5

1.05 40.0 40.0 5.0e4

1.1 30.0 30.0 2.0e4

1.2 20.0 20.0 1.0e4

1.3 10.0 10.0 1.0e3

'\*089 0.0 Inner (JET outer) target data for interpolation: '

' ' ' (dummy line) '

' R-Rsep Te Ti Jsat/Ne' 12

-1.0 1.0 999.0 0.0

0.90 2.0 2.0 1.0e3

0.99 20.0 20.0 1.0e5

1.00 100.0 100.0 5.0e5

1.01 80.0 80.0 4.0e5

1.02 70.0 70.0 3.0e5

1.03 60.0 60.0 2.0e5

1.04 50.0 50.0 1.0e5

1.05 40.0 40.0 5.0e4

1.1 30.0 30.0 2.0e4

1.2 20.0 20.0 1.0e4

1.3 10.0 10.0 1.0e3

$

* 088 and 089 supply probe data for interpolation onto the grid. These data can be specified as a function of a number of possible axes (PSIN, R-Rsep, Z-Zsep … and others depending on which makes the most sense in the context of the grid and the measurements – most often PSIN is used). These values are then used to define piece wise functions for Te, Ti and Jsat which are then linearly interpolated to find boundary conditions for each ring on the grid.
* The interpolation to the grid CAN be done by hand using Excel or another program to determine boundary conditions for each ring. This data is then entered on a ring by ring basis below. This takes more time but is the ONLY way to properly specify plasma conditions for an extended grid.

'\*A05 Electron Density Option ' 0

$

$ DIVIMP options

$

'+G01 Grid Option 0-JET 1-ASDEX 2-ITER ' 3

* The grid option is important as are the transport physics selection options below … HOWEVER … at the present time these should always be set to fixed values and not changed unless trying to run a different type of grid or trying to examine the impact of specific physical effects on the simulation results.

'\*G23 SONNET Grid sub-type opt 2= add boundary cells ' 2

'\*G38 Subgrid Option: 0=off 1=on ' 0

'\*G39 Subgrid cell dimensions nr,nz: ' 160 300

'\*G40 Subgrid R Range - RMIN,RMAX: ' 1.0 1.8

'\*G41 Subgrid Z Range - ZMIN,ZMAX: ' -0.35 1.15

'+G02 Non-Orthogonal Grid option 0-off 1-JET N.O. ' 3

'+G03 Parallel Distance Option 0-centers 1-edges ' 1

'+G04 Cross-field Distance Option 0-centres 1-edges ' 1

'+G05 RZ calculation option 0-centers 1-Actual RZ ' 2

'+G06 XY Grid option 0-off 1-on ' 0

'+G07 Cell Area Calculation Option 0-approx 1-polygon ' 1

'+S01 On-AXIS Toroidal B-field value ' 2.0

'+D01 Source Data Option 0-Nocorona 1-Adas ' 1

'+D02 USERID for ADAS H data (\*=use central database) ' '\*'

'+D03 Year for ADAS H data ' 96

'+D04 USERID for ADAS Z data (\*=use central database) ' '\*'

'+D05 Year for ADAS Z data ' 97

* ADAS data selection is important. A year must be chosen for the species being simulated where the required ADAS data can be found. If the data is not found or an incorrect ADAS database is specified in the ADASCENT environment variable in the rundiv script then the simulation will exit with an error indicating that the required ADAS data could not be found.

'+D06 B2FRATES name:' '/home/david/divimp/adpak/C\_rates.strahl'

'+T01 Ionization 0/1/2old 3ei 4no 5ei/dis 6no/dis ' 3

'+T02 Collision opt 0std 1inf 2zeff 3tpara ' 13

'+T03 REISER ' 0

'+T04 Friction opt 0std 1inf 2tpara ' 0

'\*T34 DperpZ Delta S Steps Option 0=OFF 1=ON ' 0

'+T05 Heating opt 0std 1inf 2zero 3Ti ' 0

'+I01 Injection opt 1/2/3 ' 7

'+P01 SOL option 0,1,1a,2,3,4,5,9,10 99file ' 6 22

'+P02 Core Option 0,1,2,3 ' 1

'+P03 Plasma decay 0std 99file ' 91 4

'+P04 ' 'BG PLASMA Options by Ring (PlasDec opts 90&91) '

' R1,R2,Sect, PlasDec, Sol, Teg, Tig, Core, Efield' 2

13 42 3.0 4.0 22.0 0.0 0.0 0.0 3.0 do not calculate ring 43 ... since it is too short

44 61 3.0 4.0 22.0 0.0 0.0 0.0 3.0

* The above options specify how the background plasma is to be calculated/assigned. In the above example … the background plasma is assigned with a simple constant background and then all of the SOL is over-written using the by ring background plasma options. This input is complex and is used to specify different types of plasma on different sections of the grid or (as in this case) avoid applying SOL option 22 to one very short ring which causes it to crash. (SOL22 does not currently work with ring 43 on this grid).
* The usual values for the SOL option would be 22 or 28 while the plasma decay option would be 4.
* The injection option is only used if the simulation starts the particles as ions.

'+F01 Read EDGE2D BG for reference 0=No 1=Yes ' 0

'+F02 Use EDGE2D Target Data Option 0=Off 1=Reg 2=Flux' 0

'\*F11 Uedge Background plasma option ' 0

'+T06 CX Recomb opt 0off 1on 2Vcx ' 0 8

'+I02 First diffuse 0inst 1random 2tpara ' 0

'+T07 Dperp option 0const 1vary ' 0

'+T08 TN1272 Perpendicular step option 0-normal 1-core ' 3

'+T09 TN14?? Pinch Velocity Option 0=off 1=all 2=main SOL' 0

'+Q01 TeB Gradient 0lin 1lin/lin 2p/a 99file ' 0

'+Q02 TiB Gradient 0lin 1lin/lin 2p/a 99file ' 0

'\*P60 Density Gradient Option ' 0

'+T10 TeB Grad Coeff 0off 1on ' 1

'+T11 TiB Grad Coeff 0off 1on ' 1

'+Q03 TN???? Te,Ti Flatten Option ' 0

'+Q04 TN1447 Te flat upstream for S > SMAX \* Teg cutoff = ' 0.0

'+Q05 TN1447 Ti flat upstream for S > SMAX \* Tig cutoff = ' 0.0

'+T12 T-GRAD Force Modification Function 0-off 1-UEDGE' 0

'+P05 Trap Tgrad Opt 0off 1on ' 1

'+I03 Control switch 0atoms 1ions ' 0

'+N01 Launch option 0distrib 1point 2asymp 3tip 4wall' 0

'+N02 Vel/angle flag 0-11 ' 1

* The control switch tells the simulation to start particles as either neutrals using the LAUNCH option or as ions using the INJECTION option.
* The launch and velocity/angle flag options instruct the code on how and where to launch neutral impurity particles in the simulation. Look at the documentation for the values for these inputs.

'+N03 TN487 Supplemental Launch Option (as above) ' -1

'+N04 TN487 Supplemental V/A flag (as above) ' -1

'+N05 Initial Neutral Vel/Ang flag (-1=above,0-13) ' -1

'+N06 TN1490 Supplemental 2D Neutral Launch 0=off 1=UEDGE ' 0

'+N07 TN1490 V/A Flag for 2D Neutral Launch (as regular) ' 15

'+D07 Sputter data option 1-old 2-93 ' 5

'+D08 Chemical Sputter Data Option ' 9

'+N08 Sputter option 0std 1special 2mix 3self 4selfva1' 3

* The sputter data option and chemical sputter data options select which databases of tabulated/calculated/experimental data to use for the physical and chemical sputtering yields of the background plasma ions on the impurity surfaces in the simulation.

'+N09 TN1209 Secondary Sputter Option ' -1

'+I04 Self- Sputtering Option 0-off 1-on ' 1

* This option turns on and off self-sputtering. (Sputtering by impurity particles which return to surfaces – this should be on for recycling gases).

'+N10 Normal option 0std 1fromT ' 0

'+N11 NEUT spreading 0off 1on ' 0

'+I05 Init ion Vel 1 ' 1

'+G08 T Ion Wall Option 0 to 2 ' 2

'+G09 T Neutral Wall Option 0 to 4 ' 2 4

'+G10 T Trap Wall Option 0 to 4 ' 3 4

* These options define the wall location for neutral particles. The ion wall option should always be 2 for the edge of the polygon grid. Neutral and trsp (private flux region) wall option values of 4 indicate that the wall definition should be found in the grid file. Option 2 indicates that the wall for these regions is included later in this input file.

'+G11 T Vessel Wall Redefinition Option (Baffle Removal)' 0

'+N12 TN1488 Neutral Impurity Velocity Type Option ' 0

'+N13 T Neutral Wall Reflection 0-off 1-on ' 0

'+I06 TN1465 Follow Imp.Ions Recombined to Neutrals 0=off ' 1

'+N14 TN1481 Imp Neutral Momentum.Tran.Coll Opt 0=off 1=on' 2

'+D09 TN1481 BG Ion Mom.Tran.Coll.Coef. (kelighi) ' 5.0E-16

'+D10 TN1481 BG Neutral Mom.Tran.Coll.Coef. (kelighg) ' 5.0E-16

'+I07 TN1479 Ion Prompt Redeposition Option 0=off 1=on ' 1

'+G12 T Target Position Option 0 to 6 ' 6

'+I08 T Target Mirror Option 0-off 1-on ' 0

'+G13 T Pre-defined geometry option -1-off 0-719 1-307 ' -1

'+I09 T Ion Periphery Option 0 to 3 ' 5

'+I10 TN996 Periphery Recycle Option 0-off 1-on ' 0

'+T13 TN505 Poloidal Velocity Drift Option 0-off 1-on' 0

'+B01 Special plasma parameter Rspec ' 1

'+G14 Central Mirror Ring Location (IR) ' 1

'+S02 Mass of plasma ions Mb ' 2.0

'+S03 Charge on plasma ions Zb ' 1

* Mass and charge of background plasma ions in the simulation.

$

$ Hydrocarbon following options:

$

'\*H15 Hydrocarbon following option, 0-off, 1-on ' 0

* This option turns on the methane breakup simulation code for cases where chemical sputtering or methane puffing is being simulated.

'\*H16 Follow higher hydrocarbon (C2+) option, 0-off, 1-on ' 0

'\*H17 WBC comparison case, 0-off, 1-on ' 0

$ Hydrocarbon launch options:

'\*H20 Model for sputtered release, 0-preset, 1-Mech ' 0

'\*H21 Preset sputtered hydrocarbon species, 10-Methane(CH4)' 10

'\*H22 Model for HC data primary, 1-E&L, 2-Brooks, 3-Janev ' 3

$'\*H23 Model for HC data sec., 0-none,1-E&L,2-Brooks,3-Janev' 0

'\*H24 Model for HC launch location (same options as CNEUTB)' 6

'\*H25 Model for HC launch angle/velocity (same as CNEUTC) ' -1

'\*H26 Launch velocity model, 0-const, 1-MB dist., 2-dual MB' 0

'\*H27 Dual MB velocity flux primary MB contrib., 0.0-1.0 ' 0.6

'\*H28 Dual MB launch velocity T2 (deg K), >0.0-2000.0 ' 2000.0

$ Hydrocarbon flight options:

'\*H30 Neutral->Ion initial velocity (same as CNEUTG) ' -1

'\*H31 Ion->neutral angle emission, 0-isot, 1-sine, 2-S dir' 0

'\*H32 Ion->neutral energy, 0-ion energy, 1- ' 0

'\*H33 Improved calculation for lambda (Sivukhin),0-off,1-on' 1

'\*H34 Disable HC transitions, 0-off,1-on ' 0

'\*H35 Improved model for electric field force,0-off,1-on ' 0

'\*H36 Fraction of potential drop in Debye region,0.0-1.0 ' 0.25

'\*H37 Cells from target to apply improved e-field, 0-5 ' 5

$ Hydrocarbon reflection options:

'\*H40 Neutral HC reflection switch, 0-off, 1-on ' 1

'\*H41 Ion HC reflection switch, 0-off, 1-on ' 1

'\*H42 Reflecting model, 0-preset, 1-Janev, 2-Alman&Ruzic ' 4

'\*H43 Preset reflection coef, fraction 0.0-1.0 refl ' 1.0

'\*H44 Reflected species model, 0-preset, 1-Alman&Ruzic ' 0

'\*H45 Reflection energy model,0-set,1-impact,2-thermal,3-AR' 0

'\*H46 Preset reflected particle energy, neutral impact (eV)' 0.0408

'\*H47 Preset reflected particle energy, ion impact (eV) ' 0.0408

'\*H48 Refl angle,-1=NRFOPT,10-norm,11-Janev ' 2

$ Hydrocarbon sputtering options.

'\*H50 HC sputtering switch, 0-off, 1-on ' 0

'\*H51 Sticking model, 0-preset, 1-Janev, 2-Alman&Ruzic ' 0

'\*H52 Preset sticking coef, -1.0=1.0-CTRESH, 0.0-1.0 stuck ' 0.0

'\*H53 Sputtered species model, 0-preset, 1-Alman&Ruzic ' 0

'\*H54 Sputtering energy model,0-set,1-impact,2-thermal,3-AR' 0

'\*H55 Preset sputtered particle energy, neutral impact (eV)' 0.025

'\*H56 Preset sputtered particle energy, ion impact (eV) ' 0.025

'\*H57 Sput angle,-1=NRFOPT,10-norm,11-Janev ' -1

'\*H60 Wall segment index for HC launch option 6 ' 93

'\*H61 HC Reaction Energy Model 0=off 1+ = on ' 0

'\*H62 HC Reaction Kinetics Model 0=Original 1=3Dvel ' 1

'\*H63 HC Ion Vperp options 0->4 see code for docs ' 1

$ Hydrocarbon output options.

'\*H90 Print r,z position data at each timestep, 0-off, 1-on' 0

'\*H91 Print r,z data at each transition, 0-off, 1-on ' 0

$

$ Hydrocarbon options complete

$

'+Q06 Temperature of electrons at 0 TeB0 (eV) ' 5.0

'+Q07 Temperature of electrons at plates TeBP (eV) ' 5.0

'+Q08 Temperature outer TeB step TeBout(eV) ' 0.0

'+Q09 Temperature inner TeB step TeBin (eV) ' 0.0

'+Q10 Temperature of trapped plasma TeBt (eV) ' 5.0

'+Q11 TN1278 Te exp decay step in trap TeBouP ' 100.0

'+Q12 Temperature gradient factor feBL1 ' 0.0

'+Q13 Temperature gradient factor feBL2 ' 0.0

'+Q14 Temperature gradient factor feBt ' 1.0

'+Q15 Temperature gradient factor feB2 ' 1.0

'+Q16 Temperature of ions at 0 TiB0 (eV) ' 5.0

'+Q17 Temperature of ions at plates TiBP (eV) ' 5.0

'+Q18 Temperature outer TiB step TiBout(eV) ' 0.0

'+Q19 Temperature inner TiB step TiBin (eV) ' 0.0

'+Q20 Temperature of trapped plasma TiBt (eV) ' 5.0

'+Q21 TN1278 Ti exp decay step in trap TiBouP ' 100.0

'+Q22 Temperature gradient factor fiBL1 ' 0.0

'+Q23 Temperature gradient factor fiBL2 ' 0.0

'+Q24 Temperature gradient factor fiBt ' 1.0

'+Q25 Temperature gradient factor fiB2 ' 1.0

'+Q26 Density at 0 NB0 (m\*\*-3)' 1.0E17

'+Q27 TN1264 Density at plates NEBP (m\*\*-3)' 1.0e17

'+Q28 Density outer NB step NBout (m\*\*-3)' 0.0

'+Q29 Density inner NB step NBin (m\*\*-3)' 0.0

'+Q30 Density of trapped plasma NBt (m\*\*-3)' 1.0E17

'+Q31 TN1278 Ne exp decay step in trap NBouP ' 100.0

$

$ Shift the target probe data that is read from the DIVIMP input file (the

$ LPDATO AND LPDATI arrays) by the specified amount. A positive shift

$ moves the data outward (generally in the direction of increasing major

$ radius) along the target. The default for both quantities is 0.0.

$

'\*078 Target data shift JET-i/o CMOD,DIIID-o/i (m)' -0.000 -0.000 TARSHIFT (0.0)

'+Q32 TN1347 Langmuir Probe Switch 0=Nb 1=Isat ' 1

* This option specifies whether the probe data for surfaces which is required in the input file is in the format Te(eV),Ti(eV),nb(/m3) or Te(eV),Ti(eV),Jsat(A/m2).
* Some assumption about the relationship between Te and Ti at the target must be made unless experimental data like heat flux measurements are available to further constrain the values.

$

$ NOTE: For DIIID grids with the Xpoint down the meaning of

$ INNER and OUTER are the reverse of JET grids - the

$ following entry contains the data for the OUTER

$ DIIID target - it would contain the data for

$ the inner target for a JET grid.

$

'+Q33 OUTER Target Data Multipliers (Te,Ti,Nb):' 1.0 1.0 1.0

'+Q34 ' 'Probe data at outer plate (opt4) or total (opt3)'

' Ring , TeBP , TiBP , NBP : Number of rows - ' 0

* Input data for each “outer” target element (the nks end of the flux tubes) … it is indexed by ring number which are described in the geometry output section of a case in the .dat file.

$

$ NOTE: For DIIID grids with the Xpoint down the meaning of

$ INNER and OUTER are the reverse of JET grids - the

$ following entry contains the data for the INNER

$ DIIID target - it would contain the data for

$ the outer target for a JET grid.

$

'+Q35 INNER Target Data Multipliers (Te,Ti,Nb):' 1.0 1.0 1.0

'+Q36 ' 'Probe data at inner plate (T grad opt4)'

' Ring , TeBP , TiBP , NBP : Number of rows - ' 0

* Input data for each “Inner” target element by ring number (Inner is the IK=1 index target elements in the code.)

$

$ Confined plasma

$

$ Needs to be updated for PW experiment

$

'+Q37 ' 'CORE Plasma Data - for Core Options 1,2 and 3'

' Ring , TeB , TiB , NB , Vb : Number of rows - ' 15

2 1900 1900 9.00E+19 0.0 Data made up for test case

3 1500 1500 8.50E+19 0.0

4 1200 1200 8.00E+19 0.0

5 1100 1100 8.00E+19 0.0

6 950 950 8.00E+19 0.0

7 800 800 7.00E+19 0.0

8 600 600 6.00E+19 0.0

9 400 400 5.00E+19 0.0

10 300 300 4.00E+19 0.0

11 200 200 3.00E+19 0.0

12 150 150 2.00E+19 0.0

* Background plasma data for confined plasma rings … indexed by ring number .. this data usually comes from Thomson measurements or other core profile measurements of Te, Ti and ne.

'+T14 Cross Field Diffusion factor Dperp (m\*m/s)' 0.3

'+T15 Trap Cross Field Diffusion factor Dperpt(m\*m/s)' -1.0

* Anomalous diffusion coefficient applied to calculation of the cross-field transport of ions.

'+T16 Perpendicular Pinch Velocity Vpinch (m/s)' 0.0

'+S04 Mass of impurity ions Mi ' 183.84

'+S05 Atomic number of impurity ions Zi ' 74

* Mass and maximum number of charge states of the impurity species to be simulated by the code.

'+D11 Characteristic energy Ebd Ebd (eV) ' 0.0

'+I11 Z effective (self) Zeff ' 1

'+S06 Initial temperature Tem1 (eV) ' 0.026

'+S07 Initial temperature (2) Tem2 (eV) ' 0.0

'+S08 Initial R position of impurity R0 (m) ' 1.4

'+S09 Initial Z position of impurity Z0 (m) ' 0.9

'+I12 Initial ionization state of impurity ions ' 1

'+D12 Neutral hydrogen density parameter Nhc (m\*\*-3)' 1.0E15

'+D13 Nho (m\*\*-3)' 3.0E18

'+D14 lamhx (m) ' 0.02

'+D15 lamhy (m) ' 0.11

'+D16 Constant for CX Recomb option 2 Vcx (m/s) ' 2.4E4

'+B02 For average density "near" target xnear (m) ' 0.6

'+B03 For average density "near" target ynear (m) +/-' 0.6

'+N15 Measure theta from T (degrees to X=0) for launch' -90.0

'+Q38 Inboard plasma flow velocity Vhin (m/s) ' 0.0

'+Q39 Inboard electric field Ein (V/m) ' 0.0

'+Q40 Outboard plasma flow vel (SOL5) Vhout (m/s) ' 0.0

'+Q41 Outboard electric field (SOL5) Eout (V/m) ' 0.0

'+I13 Collision Enhancement Factor Zenh ' 1.0

'+I14 Set Ti = max(Ti,Tb) when reaching state (0 off) ' 0

'+D17 Threshold yield for sput opt3 (eV) ' 0.1

'+D18 Bombarding ion charge state Zimp ' 0

'+D19 Bombion type 0Zb 1H 2D 3T 4He4 5C 6Zi 7O ' 0

'+D20 Ionisation rate factor for neutrals IRF' 1.0

'+D21 Sputtering Enhancement Factor SEF' 1.0

'+P06 SOL Enhancement Factor - Electric Field SOLEF' 1.0

'+P07 SOL Enhancement Factor - Drift Velocity SOLVF' 1.0

'+P08 SOL1a Factor fl ' 0.01

'+P09 SOL1a Factor fs ' 1.0

'+P10 SOL10 Reversal Mach Number fRM ' 1.0

'+P11 SOL10 factor kin ' 1.0

'+P12 SOL10 factor kout ' 1.2

'+P13 SOL10 factor fRmin' 0.01

'+P14 SOL10 factor fRmax' 0.4

'+P15 SOL6&7 Vb Length factor 1 (\* SMAX) VbL1 ' 0.166

'+P16 SOL6&7 Vb multiplication factor 1 VbM1 ' 0.0

'+P17 SOL6&7 Vb Length factor 2 (\* SMAX) VbL2 ' 0.5

'+P18 SOL6&7 Vb multiplication factor 2 VbM2 ' 0.0

'+S10 Operation Mode 1 Time-Dependent 2 Steady-State' 2

'+I15 Maximum ionization state ' 74

'+S11 Number of impurity ions to be followed ' 100

'+S12 TN487 Number of Supplementary Neutrals to Launch ' 0

'+S13 Quantum iteration time for atoms fsrate (s) ' 1.0E-8

'+S14 Quantum iteration time for ions qtim (s) ' 1.0E-7

'+S15 T CPU time limit in seconds cpulim (s) ' 100000.0

* Maximum charge state to be followed in the simulation. Number of particles to be launched. More particles take more time and give better statistics. Iteration times are the simulation time steps applied to the neutrals and the ions. Shorter time steps result in better spatial resolution and temporal resolution of fast processes but can take significantly more time for a case to run since run time is roughly linear with the simulation time steps.

'+S16 ' 'Average Dwell Times (s) for each state 0,1,2..'

' Number of dwell times given below :-' 0

'+S17 ' 'Dwell Time Factors for time-dependent analysis'

' Number of dwell time factors :-' 0

'+S18 T Maximum dwell time for steady state (s) ' 0.5

* This is the maximum time the simulation will follow any one particle. As long as few or no particles reach this limit the value is fine. It is intended to stop following particles that may become trapped for one reason or another.

'+D22 ' 'Set of Yield Modifiers for Primary, Secondary neutrals'

' Number of rows of (X,Mpt,Mst,Mct,Mpw,Mcw,Refl) data-' 3

0.0 0.0 0.0 0.0 0.0 0.0 0.0 1.0 default - turn off all sputtering

74.0 96.0 1.0 1.0 1.0 1.0 1.0 1.0 turn on sputtering - elements 74 to 96 - upper inner

105.0 138.0 1.0 1.0 1.0 1.0 1.0 1.0 turn on sputtering - elements 105 to 138 - upper outer

$ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 default - turn off all

* This array of input data is important for controlling in detail the sources calculated by the code. The default entry specifies values of 1.0 for all yield modifiers for all surfaces (the commented out last line). The example above turns off all yields on all surfaces and then turns them on for only wall elements 74 to 96 and 105 to 138 which are the upper inner and outer targets of this grid respectively.

'+D23 TN? Fixed Yield Value for Sputter Data Option 4 ' 0.001

'+D24 TN1209 Target Temperature (K) for Chem. Sputt. Opt. ' 450.0

'+D25 Main Wall Temperature (K) for Chem. Sputt. ' 350.0

'+D26 TN1450 PP Wall Temperature (K) for Chem. Sputt. ' 400.0

'+D27 ' 'TN1450 Wall Temperatures (K) for specific segments'

' Number of segment ranges (Index1 Index2 Temp):' 0

'+B04 Debug atoms (0 off, >0 print every nth timestep)' 0

'+B05 Debug ions (0 off, >0 print every nth timestep)' 0

'+B06 Debug ion velocity (0 off, >1 on) ' 0

'+S19 Random number seed (0 generate new seed) ' 0

'+H01 PIN Random number seed (<0=1, 0 generate new) ' 0

'+A04 Print option (0 reduced, 1 full) ' 9

* This option turns on many optional and debugging outputs. A value of zero will produce the minimum. A value of 1-8 can produce other outputs and a value of 9 should produce all the outputs available.

'+H02 PIN Data Print option (0 reduced, 1 more) ' 0

'+S20 Number of Iterations ' 1

'+I16 Stop following ions reaching Main Plasm 0no 1yes' 0

'+G15 Rectangular grid for neutrals 0calculate 99file ' 0

'+D28 Temperature Gradient Coefficient parameter ZO ' 4

'+F03 Plasma condition for missing SOL rings CNIWA' 1

'+F04 ' 'EDGE1D/2D Deuterium drift vel. mult. factor VMF '

' Number of VMF blocks ' 0

' Ring Range :-' -20 -30

' J0 & J1 :-' 5 5

'+ VMF0,1,2 :-' 1.000 1.000 1.000

'+I17 Ion removal loss time Tloss (s) ' 0.000

'+P19 Power density P/A (W/m2)' 3.0E+07

'+P20 Parallel heat conduction coeff K0 ' 2.0E+03

'+P21 Parallel heat conduction -ions K0I ' 58.9

'+P22 Override input E-field from file E=0 0-off 1-on' 3

'+P23 T1433 E-field Opt 4 - Length of E-field region \*SMAX' 0.25

'+P24 T1433 E-field Opt 4 - Te collisionality multiplier ' 2.0

'+P25 TN401 Decay length for ionization source Ls SOL12 ' 0.08

'+P26 T Second decay characteristic length ' 0.08

'+P27 T Source fraction ' 0.5

'+P28 TN401 Decay length for radiative losses Lr SOL12 ' 0.08

'+P29 TN401 Coefficient for radiative losses Pr SOL12 ' 1.0

'+P30 TN775 Radiation source strength fraction Frr ' 1.0

'+P31 TN401 Source Ionization Option 0-lin 1-exp SOL12 ' 1

'+P32 TN401 Source RAdiation Option 0-lin 1-exp SOL12 ' 3

'+P33 TN660 Imaginary Root Option SOL12+ ' 1

'+P34 TN407 Flux Recirculation Option 0-off 1-on ' 0

'+P35 ' 'TN????+407 Set of flux specifications '

' Ring , data1(I), data2(O), data3 : Rows - ' 0

'+B07 TN442 Z-value defining divertor region (m) ' 1.7

'+I18 TN480 Ring for ion injection option 2 INJIR ' 28

'+I19 TN480 Factor for Region Lower Bound INJF1 ' 0.547

'+I20 TN480 Factor for Region Upper Bound INJF2 ' 0.549

'+I21 TN443 X-max for Far-Periphery region (O/I) ' 0.02 0.02

'+I22 TN443 Far-Periphery Target Loss Time (O/I) ' 1.0e-3 1.0e-3

'+I23 TN688 Far-Periphery Diffusion Rate ( < 0 = CDPERP ) ' -1.0

'+N16 ' 'TN487 Launch probability modifiers for each '

' TN487 Wall segment range #1 #2 mod. :- ' 0

'+N17 TN721 Use Wall Probabilities as Absolute 0=No 1=Yes ' 0

* These options should USUALLY be set to zero as above. These values will over-ride any wall launch distribution calculated by the code. However, if an external method has been used to determine the impurity particle source strength and distribution then these values should be set to the appropriate values determined by the external analysis.

'\*T31 Poloidal Drift Region Option 1=SOL+PFZ 2=SOL ' 2

'\*T32 Poloidal Drift MACH number format option ' 1

'+T17 TN505 Poloidal Drift Velocity (m/s or MACH)' -0.4

'+T18 TN Poloidal Drift Range F1\*SMAX < S < F2\*SMAX' 0.2 0.8

'+D29 CEMAXF factor for sputtering velocities ' 1.0

'+D30 TN521 Impact Energy for wall launch Vel. dist (eV) ' 100.0

'+H03 TN408 Run PIN from inside DIVIMP 0-NO 1-YES ' 1

'+H04 ' 'TN408 Pin: reire07 '

'+H05 PIN Cell Area Option (IHCORR) ' 1

'+H06 PIN Hybrid Wall Option 0=off 1,2=selection ' 0

'+H07 PIN Puffing Option - 0=off 1=on ' 2

'+H08 PIN Puff Location switch - 0=main SOL 1=PP ' 0

'+H09 PIN Puff fraction (opt 1) ' 0.0

'+H10 PIN Recycle -> Puff fraction (puff opt 2) ' 0.16

'+H11 PIN Puff Injection temperature (eV) ' 0.5

'+H12 PIN Puff location indices JHPUF1(1 and 2)' -17 -1000

'+H13 PIN Puff location indices JHPUF2(1 and 2)' -16 -1001

'+P36 TN408 Calculate SOL iteratively? 0-NO 1-YES ' 1

'+P37 TN408 Secondary SOL option for iterative calculation' -2

'+P38 TN408 Ionization option for iterative SOL ' 3

'+P39 Number of Pin/SOL iterations ' 3

'+G16 ' 'TN Set of Plate coordinates '

' TN Ring #, Outer R,Z , Inner R,Z : ' 0

'+G17 ' 'Wall coordinates '

' TN R,Z coordinates starting at outer plate ' 59

* If wall option 2 has been specified above then this listing contains the coordinates of the wall to be used by the code.

1.7560 -1.1910 1.6760 -1.0500 LOWER DOME

1.6760 -1.0500 1.6460 -1.0100

1.6460 -1.0100 1.5780 -0.9630

1.5780 -0.9630 1.5200 -0.9480

1.5200 -0.9480 1.4510 -0.9550

1.4510 -0.9550 1.3200 -0.9870

1.3200 -0.9870 1.3000 -0.9900

1.3000 -0.9900 1.3475 -0.9015 LOWER INNER TARGET

1.3475 -0.9015 1.3950 -0.8130

1.3950 -0.8130 1.4220 -0.7520

1.4220 -0.7520 1.4410 -0.6640

1.4410 -0.6640 1.4420 -0.5910

1.4420 -0.5910 1.4420 -0.5905

1.4420 -0.5905 1.3800 0.0000 INNER LIMITER

1.3800 0.0000 1.4420 0.5905

1.4420 0.5905 1.4420 0.5910

1.4420 0.5910 1.4410 0.6640 UPPER INNER TARGET

1.4410 0.6640 1.4220 0.7520

1.4220 0.7520 1.3950 0.8130

1.3950 0.8130 1.3000 0.9900

1.3000 0.9900 1.3200 0.9870

1.3200 0.9870 1.4510 0.9550 UPPER DOME

1.4510 0.9550 1.5200 0.9480

1.5200 0.9480 1.5780 0.9630

1.5780 0.9630 1.6460 1.0100

1.6460 1.0100 1.6760 1.0500

1.6610 1.0300

1.6760 1.0500 1.7560 1.1910

1.7160 1.1205

1.7560 1.1910 1.7630 1.2030

1.7630 1.2030 1.7700 1.1696 UPPER OUTER TARGET

1.7700 1.1696 1.8050 1.0190

1.8050 1.0190 1.8220 0.9680

1.8220 0.9680 1.8600 0.9000

1.8600 0.9000 1.8930 0.8620

1.8930 0.8620 2.2200 0.5420

2.2200 0.5420 2.2610 0.5110

2.2610 0.5110 2.3010 0.4940

2.3010 0.4940 2.3600 0.4850

2.3600 0.4850 2.6330 0.4850

2.6330 0.4850 2.6861 0.3322

2.6861 0.3322 2.7190 0.1675 VACUUM VESSEL WALL

2.7190 0.1675 2.7300 0.0000

2.7300 0.0000 2.7190 -0.1675

2.7190 -0.1675 2.6861 -0.3322

2.6861 -0.3322 2.6330 -0.4850

2.6330 -0.4850 2.3600 -0.4850 LOWER OUTER TARGET

2.3600 -0.4850 2.3010 -0.4940

2.3010 -0.4940 2.2610 -0.5110

2.2610 -0.5110 2.2200 -0.5420

2.2200 -0.5420 1.8930 -0.8620

1.8930 -0.8620 1.8600 -0.9000

1.8600 -0.9000 1.8220 -0.9680

1.8220 -0.9680 1.8050 -1.0190

1.8050 -1.0190 1.7875 -1.0943

1.7875 -1.0943 1.7700 -1.1696

1.7700 -1.1696 1.7630 -1.2030

1.7630 -1.2030 1.7560 -1.1910

1.7560 -1.1910 1.6760 -1.0500 LOWER DOME

'+G18 ' 'Wall coordinates - PFZ '

' TN R,Z coordinates ' 0

'+D31 TN83? Maximum Number of sputtered generations ' 75

* This number is significant for cases modeling recycling particles like inert gases. Ar, Ne, He … it is the maximum number of generations that will be followed for a specific initially launched Monte Carlo particle.

'+B08 TN Ring number for detailed background data ' 8

'+N18 A18 Power of cosine release dist. (V/A 12,13) ' 1.0

'+N19 TN???? Extra Velocity Multiplier for V/A 14 ' 1.0

'+N20 TN???? Velocity Multiplier for Recombined Neutrals ' 1.0

'+C01 ' 'Set of S-distances for ion leakage diagnostic(m)'

'TN982 Number of S-values :-' 4

5.0

10.0

15.0

20.0

$

$ O/I for Xpoint UP (JET) - I/O for Xpoint DOWN (DIIID)

$

'+R01 DETACHED PLASMA: Length Scaling Switch 0-S 1-P' 0

'+R02 TN988 Detached Plasma Model: Te/Te0 at L1 O/I ' 1.0 1.0

'+R03 TN1439 Ti/Ti0 at Position L1 O/I ' 1.0 1.0

'+R04 TN988 Ne/Ne0 at Position L1 O/I ' 10.0 10.0

'+R05 TN1496 Exponent for Ne Equation 1.0=lin O/I ' 1.0 1.0

'+R06 TN988 Qrad/Q0 O/I ' 5.0 5.0

'+R07 TN988 L1/SMAX ratio O/I ' 0.1 0.1

'+R08 TN988 L2/SMAX ratio O/I ' 0.2 0.2

'+R09 TN988 LV/SMAX ratio O/I ' 0.2 0.2

'+R10 TN Velocity multiplier at L1 O/I ' 1.0 1.0

* Parameters for the detached plasma specification SOL option 21 – see documentation for more details. Not used if SOL option 21 is not used.

$

$ R11,R13 - INNER for Xpoint UP (JET) - OUTER for Xpoint DOWN (DIIID)

$ R12,R14 - OUTER for Xpoint UP (JET) - INNER for Xpoint DOWN (DIIID)

$

'+R11 ' 'TN DETACHED Plasma Specifications on a by ring basis'

'TN OUTER/DIIID- IR TER TIR NR NEXP QR L1R L2R LVR VBM - N= ' 0

$

$ Sample input

$

$ 14.0 16.0 16.0 1.4 1.0 40.0 0.3 0.5 0.1 1.0

$ 15.0 10.0 10.0 1.2 1.0 20.0 0.2 0.5 0.1 1.0

$ 16.0 8.0 8.0 1.0 1.0 10.0 0.2 0.5 0.05 1.0

$ 17.0 6.0 6.0 1.0 1.0 10.0 0.2 0.5 0.05 1.0

$ 18.0 8.0 8.0 0.9 1.0 10.0 0.15 0.5 0.05 1.0

$

'+R12 ' 'TN DETACHED Plasma Specifications on a by ring basis'

'TN INNER/DIIID - IR TER TIR NR NEXP QR L1R L2R LVR VBM - N= ' 0

$

$ Sample input

$

$ 14.0 8.0 8.0 100.0 1.0 180.0 0.2 0.5 0.02 1.0

$ 15.0 5.0 5.0 120.0 1.0 260.0 0.2 0.5 0.02 1.0

$ 16.0 4.0 4.0 140.0 1.0 300.0 0.2 0.5 0.02 1.0

$

'\*R13 ' 'OUTER/DIIID EXTRA SOL 21 Parameter data: '

' ' ' R13 - ADDITIONAL SOL OPTION 21 DATA '

' IR L1A L1B N1A N1B TE1A TE1B TI1A TI1B' 0

$

$ Sample input

$

$ 14.0 0.05 0.2 15.0 5.0 2.0 2.0 2.0 2.0

$ 15.0 0.05 0.18 8.0 3.0 2.0 2.0 2.0 2.0

$ 16.0 0.05 0.16 6.0 2.5 2.0 2.0 2.0 2.0

$

'\*R14 ' 'INNER/DIIID EXTRA SOL 21 Parameter data: '

' ' ' R14 - ADDITIONAL SOL OPTION 21 DATA '

' IR L1A L1B N1A N1B TE1A TE1B TI1A TI1B' 0

$

$ Sample input

$

$ 14.0 0.02 0.10 60.0 120.0 1.0 1.0 1.0 1.0

$ 15.0 0.02 0.10 60.0 120.0 1.0 1.0 1.0 1.0

$ 16.0 0.02 0.10 70.0 140.0 1.0 1.0 1.0 1.0

$

'+D32 TN1007 ABSFAC or Power - Specified - Use if > 0.0 ' 0.0

* For cases where the particle source strength can not be calculated by the code … a gas puff for example … or where the particle source is calculated using some other mechanism (output from another code for example) … this value specifies the absolute particle influx represented by the particles launched in the simulation. For example, a gas puff could be 8.0e19 particles/s … depending on gas flow rate … then the puff in the simulation would be scaled to this value.

'+G19 ASDEX U - GRID CHARACTERISTICS: Number of Rings ' 26

'+G20 Number of Knots ' 34

'+G21 Cut ring ' 7

'+G22 Cut point 1 ' 1

'+G33 Cut point 2 ' 34

'+F05 SONNET-Number of Fluids in B2 Background Plasma File' 7

'+F06 Read Aux. Background Input File 0=off 1=on' 0

'+D33 TN1200 Stgrad - Distance where Tgrad forces -> 0 ' 1.0

$

$ Parameters for SOL model

$

* SOL 22 is one of the frequently used background plasma solvers – the following block of parameters apply to SOL22 … however, the values set below should be reasonable defaults and in most cases do not need to be changed.

'+201 Force Te=Ti through SOL 22 0=off 1=on ' 0 1

'+202 Imposed mach number at the target ' 1.0

'+203 Delta mach number for initial iterative solution' 0.1

'+204 Maximum resolution in calculation of m0 ' 0.00001

$

$ Ionization source

$

'+205 Ionization Source Lengths 0=Absolute 1=Relative' 1

'+206 Start of Ionization Source (for supported opts) ' 0.0

'+207 End or Length of Ionization Source ' 0.4

'+208 Decay length of ionization source ' 0.05

$

$ Radiation source

$

'+209 Length of radiation source ' 5.0

'+210 Decay length of radiation source ' 0.5

'+211 Source strength fraction (frr) ' 2.0

'+212 Garching Model: Alpha = ni/ne ratio ' 1.0

'+213 Garching Model: Tbase = Tratio denominator ' 15.0

'+214 Garching Model: Exponent 1 ' 1.5

'+215 Garching Model: Exponent 2 ' -3.0

$

$ Miscellaneous

$

'+216 Gamma correction factor in gammai ' 0.0

'+217 Gamma correction factor in gammae ' 0.0

'+218 CX power coefficeint CEICF ' 1.0

'+219 Recycling source fraction ' 1.0

'+220 Pei Power Transfer Correction Factor ' 1.0

'+221 Velocity Error Switch 0=Cs 1=const ' 1

$

$ Gperp and Gextra option parameters

$

'+222 Distributed Power Start position \* SMAX ' 0.10

'+223 Distributed Power End position \* SMAX ' 0.50

'+224 Distributed GPERP particle Fraction- non-uniform' 0.8

'+225 Distributed GPERP Start position \* SMAX ' 0.0

'+226 Distributed GPERP End position \* SMAX ' 0.1

'+227 Gextra Source strength - Target flux multiplier ' 0.1

'+228 Gextra Source Start/Stop \* SMAX ' 0.2 0.35

'+229 Gextra Sink Start/Stop \* SMAX ' 0.65 0.8

$

$ PP target loss redistribution parameters

$

'+230 PP target power loss redistribution range \*SMAX ' 0.1

$

$ Edge2D mid-cell matching option parameters

$

'+231 Knot Start Index for E2D Option 9 ' 8

'+232 Plasma Fill option for missing knots - E2D Opt 9' 1

$

$ Power Term Cutoffs

$

'+233 Qe Term - Temperature Cutoff (eV) ' 0.0

'+234 PINQID - Atomic Ionization - T cutoff (eV) ' 0.0

'+235 PINQID - Molecular Ionization - T cutoff (eV) ' 0.0

'+236 PINQID - Recombination - T cutoff (eV) ' 0.0

'+237 Qi Term/PINQID-Charge Exchange- T cutoff (eV) ' 0.0

'+238 PINQID - CX option 1 - Reference T - (eV) ' 1.0

'+239 Minimum Temperature allowed in Solver (spec<0) ' 0.1

'+240 Minimum T allowed as fraction of Tmax reached ' 0.5

$

$ Momentum loss term input variables

$

'+241 Momentum loss term multiplier (Usually 1.0) ' 1.0

'+242 Friction factor for Momentum loss formula ' 1.0

'+243 Length of the Momentum loss region \* Smax ' 0.25

'+244 Decay length of the Momentum loss region \* Smax ' 0.1

'+245 Ratio of CX to IZ events (fixed) ' 1.0

'+246 Te cutoff for increased CX multiplier (eV) ' 5.0

'+247 Te lower limit cutoff for CX multiplier (eV) ' 1.0

$

$ PIN power term multipliers

$

'+248 PINQE multiplier ' 1.0

'+249 PRAD option 3 multiplier (x PINQE) ' 2.0

$

'+250 Initial number of stages for Runge Kutta steps ' 100

$

$ Switches

$

'+251 Switch: Ionization Opt : 0.0-exp 1.0+ - others ' 2.0

'+252 Switch: Initial IonOpt : 0.0-exp 3.0+ - others ' 0.0

'+253 Switch: PPlasma IonOpt : 0.0-exp 3.0+ - others ' -1.0 -5.0 -3.0 0.0

'+254 Switch: 5/2 nv \* kT : 0.0-off 1.0-on ' 1.0

'+255 Switch: 1/2 m v^3 \* n : 0.0-off 1.0-on ' 1.0

'+256 Switch: Prad : 0.0-off 1.0-on ' 0.0

'+257 Switch: Phelpi : 0.0-off 1.0-on ' 2.0

'+258 Switch: Pei : 0.0-off 1.0-on ' 1.0

'+259 Switch: Pcx : 0.0-off 1.0-on ' 2.0

'+260 SUB-switch: Pcx Opt 4 : PINQID- Atomic Ioniz. ' 1.0

'+261 SUB-switch: Pcx Opt 4 : PINQID- Molecular Ioniz' 1.0

'+262 SUB-switch: Pcx Opt 4 : PINQID- Recombination ' 1.0

'+263 SUB-switch: Pcx Opt 4 : PINQID- Charge Exchange' 2.0

'+264 Switch: PP ElecLoss : 0.0-off 1.0-XPT 2.0-DIS' 1.0

'+265 Switch: PP IonLoss : 0.0-off 1.0-XPT 2.0-DIS' 1.0

'+266 Switch: Visc 1 - N calc: 0.0-off 1.0-on ' 0.0

'+267 Switch: Momentum loss : 0.0-off 1.0-on ' 1.0

'\*282 Extended Momentum loss option (header) '

' ' ' Extended Momentum loss option Input Data '

' Number of lines of input IR TARG2 TARG1 ' 0

'+268 Switch: Iterative Mach : 0.0-off 1.0-on ' 0.0

'+269 Switch: Edge 2D Data : 0.0-off 1.0-on ' 0.0

'+270 Switch: Power Distrib. : 0.0-con 1.0-lin 2.0-xpt' 5.0

'+271 Switch: PPlasma PowDist: 0.0-con 1.0-lin 2.0-xpt' 10.0

'+272 Switch: Gamma Perp : 0.0-off 1.0-on ' 1.0

'+273 Switch: PP Gamma Perp : 0.0-off 1.0-on ' 6.0

'+274 Switch: GPero Src/Sink : 0.0-off 1.0-on ' 0.0

'+275 Switch: Major Radius : 0.0-off 1.0-nor 2.0-inv' 0.0

'+276 Switch: Core Gamma Src : 0.0-off 1.0-all 2.0-xpt' 0.0

'+277 Switch: Recomb. Src : 0.0-off 1.0-PIN ' 1.0

'+278 Switch: Smooth Centres : 0.0-off 1.0-on ' 0.0

'+279 Switch: Detached Option: 0.0-off 1.0-out 2.0-in ' 0.0

'+280 Switch: Error corrected: 0.0-off 1.0-cond ' 10.0

'+281 ' 'Automatic DEFAULT Solver condition switches '

' DEFAULT applied automatically to these rings' 0

'+S21 SOLTEST - 0.0 run normally -1.0 test SOL opt ' 0.0

'+D34 H Recombination Calculation Option 4-Adas 0+-oth' 4

'+D35 Recombination Limit Cut-OFF Temperature (eV) ' 0.0

$

$ Dperp Xperp Extractor Options

$

'+C02 TN1303 Dperp Extractor - methods used - 0 1 2 ' 2

'+C03 TN1310 Dperp Ext. 0=only to Xpoint 1=Full Field Line' 1

'+C04 TN1310 Dperp Ext. Outer Ring Losses 0=off 1=on ' 1

'+C05 TN1309 Dperp Ext. Dperp Convection 0=off 1=on ' 1

'+C06 TN1311 Dperp Ext. 1/2 Cell Flux Corr. 0=off 1=on ' 0

'+C07 TN1311 Dperp Ext. Calc. Average Dperp. 0=off N=on ' 1

'+C08 TN1311 Dperp Ext. Major Radius Corr. 0=off 1=on ' 0

'+C09 TN1314 Dperp Ext. Gradient Smoothing 0=off N=on ' 0

'+C10 TN Dperp Ext. Gradient Calc Meth -1,0,1 ' 0

'+C11 TN Dperp Ext. Cross-field Area 0-centre 1-bound' 0

'+C12 TN Dperp Ext. Power Loss Terms 0-off 1-on ' 1

'+C13 TN Dperp Ext. Non-ortho Correction 0-off 1-on ' 1

'+C14 TN Dperp Ext. Pei Correction Factor ' 1.0

'+C14 TN1373 Dperp Ext. Source Recycle Correction Factor ' 1.0

'+C16 TN1445 Dperp Ext. Dperp/Xperp Fixed Ratio 0.0=off ' 0.0

$

$ The following lines specify the parameters for the linearly

$ interpolated specified BG SOL option. This is purely empirical.

$ S-value Function Value

$ The form is: 0.0 F0

$ S1 F1

$ S2 F2

$ For S>S2 F=F2

$

'+P40 TN Te S1 - First S -value = ctes1 \* SMAX ' 0.05

'+P41 TN Te F1 - First Te-value = ctef1 \* te0 ' 1.5

'+P42 TN Te S2 - Second S -value = ctes2 \* SMAX ' 0.3

'+P43 TN Te F2 - Second Te-value = ctef2 \* te0 ' 2.0

$

'+P44 TN Ti S1 - First S -value = ctis1 \* SMAX ' 0.05

'+P45 TN Ti F1 - First Te-value = ctif1 \* ti0 ' 1.5

'+P46 TN Ti S2 - Second S -value = ctis2 \* SMAX ' 0.3

'+P47 TN Ti F2 - Second Te-value = ctif2 \* ti0 ' 2.0

$

'+P48 TN Nb S1 - First S -value = cnes1 \* SMAX ' 0.05

'+P49 TN Nb F1 - First Te-value = cnef1 \* ne0 ' 2.0

'+P50 TN Nb S2 - Second S -value = cnes2 \* SMAX ' 0.35

'+P51 TN Nb F2 - Second Te-value = cnef2 \* ne0 ' 2.0

$

'+P52 TN vb S1 - First S -value = cvbs1 \* SMAX ' 0.1

'+P53 TN vb F1 - First Te-value = cvbf1 \* ti0 ' 0.25

'+P54 TN vb S2 - Second S -value = cvbs2 \* SMAX ' 0.4

'+P55 TN vb F2 - Second Te-value = cvbf2 \* ti0 ' 0.0

$

'+C17 Vertical Reciprocating Probe - Intersection # ' 1

'+C18 Vertical Reciprocating Probe - R-Value ' 1.94

'+C19 Horizontal Reciprocating Probe - Intersection # ' 2

'+C20 Horizontal Reciprocating Probe - Z-Value ' -0.04199

'+P56 TN1424 Core Option4,5- Velocity decay fraction \*SMAX' 0.05

'+P57 TN1424 Core Option4,5- Te,Ti decay fraction \*SMAX' 0.05

'+P58 TN1427 Core Option4,5- Velocity decay frac 2 \*SMAX' 0.5

'+P59 TN1427 Core Option4,5- Te,Ti decay frac 2 \*SMAX' 0.1

'+D36 TN1429 T-GRAD Force Modification - Factor Applied ' 2.0

$' EDGE2D Special Correction Option 0=off 1=on ' 0

$

$ SOL 23 - Input parameters

$

'+300 SOL23 Parameter read option 0-NO 1-YES ' 1

$

$ SOL 23 - Input parameters (s23\_par\_...)

$

'+301 SOL23 ptipte ................................ ' 1.0

'+302 SOL23 adaptnr ' 2

'+303 SOL23 debugflag ' 0

'+304 SOL23 debugnr ' 0

'+305 SOL23 refresh ' 100

'+306 SOL23 artvisc2 .............................. ' 0.3

'+307 SOL23 artvisc4 ' 0.01

'+308 SOL23 dtf ' 0.5

'+309 SOL23 dtg ' 1.0E24

'+310 SOL23 grid0 ' 0.1

'+311 SOL23 gridexp ................................ ' 1.25

'+312 SOL23 itermax ' 1000

'+313 SOL23 ga1 ' 10.0

'+314 SOL23 ga2 ' 0.01

'+315 SOL23 ga3 ' 0.2

'+316 SOL23 ga4 ................................. ' 10.0

'+317 SOL23 updtqpit ' 0

'+318 SOL23 updtqp2 ' 0.003

'+319 SOL23 updtqp3 ' 0.03

'+320 SOL23 updtqpte ' 0.01

'+321 SOL23 garelax ................................ ' 0.03

'+322 SOL23 gaiter ' 1

'+323 SOL23 limitte ' 1

'+324 SOL23 celldte ' 0.95

'+325 SOL23 updtbcte ' 30.0

'+326 SOL23 updtdel0 .............................. ' 1.0

'+327 SOL23 updtdel1 ' 1.0

'+328 SOL23 updtdelm ' 0.1

'+329 SOL23 qbrelax ' 0.02

'+330 SOL23 gridg ' 0.03

'+331 SOL23 grid\_dx0 ............................... ' 0.001

'+332 SOL23 gae ' 5.0

'+333 SOL23 gai ' 2.5

'+334 SOL23 tectrl ' 1

'+335 SOL23 drflag ' 0

'+336 SOL23 dsflag ................................ ' 0

'+337 SOL23 limrel1 ' 0.03

'+338 SOL23 limrel2 ' 0.1

'+339 SOL23 limrel3 ' 0.03

'+340 SOL23 limrel4 ' 0.03

'+341 SOL23 tulimit ............................... ' 5.0

'+342 SOL23 g0relax ' 0.1

'+343 SOL23 p0relax ' 0.02

'+344 SOL23 dpdrflag ' 0

'+345 SOL23 dpdrtemin ' 1.0

'+346 SOL23 dpdrstep .............................. ' 0.1

'+347 SOL23 nuflag ' 0

'+348 SOL23 nulimit ' 1.0E20

'+349 SOL23 vnmult ' 1.0

'+350 SOL23 pinmom ' 0

'+351 SOL23 emolec ' 3.0

'+352 SOL23 rec\_heat ............................... ' 13.6

'+353 SOL23 pinqimult ' 1.0

'+354 SOL23 pinqiflag ' 0

'+355 SOL23 prring0 ' 7

'+356 SOL23 prring1 ' 3

'+357 SOL23 qperp34 ................................. ' 0

'+358 SOL23 qeiflag ' 1

'+359 SOL23 chie ' 1

'+360 SOL23 joule ' 1

'+361 SOL23 fluxexp ' 1

'+362 SOL23 qrec .................................. ' 1

'+363 SOL23 fzrad ' 1.0

'+364 SOL23 dvmrel ' 2

'+365 SOL23 intopt ' 1

'+366 SOL23 adaptgrid ' 0

'+367 SOL23 seed ' 1

'+368 SOL23 izlen .................................. ' 0.5

'+369 SOL23 izlam ' 0.03

'+370 SOL23 izoffset ' 0.03

'+371 SOL23 momlen ' 0.1

'+372 SOL23 relax ' 0.01

'+373 SOL23 maxtol ' 3.0E-3

'+374 SOL23 rmstol ................................. ' 3.0E-4

'+375 SOL23 Qperp ' 1

c

c

c+H14 Nimbus input namelist: (see, for example, PINPGX for definitions)

c

&NIMBIN

NHIST=2000,

KINDPR=2,

IFPRIM=1,

IAEMIS=0,

TWALL=300.0,

IYCHEM=4,

EYCHEM=0.0,

IALB=2,

LWALL=T,

LBUFLE=F,

LPWALL=T,

NTSPUT=1,

LPUMP=T,

INPUMP=18,

FPUMP='/u/progs/div6/shots/pump/jetmk2/vers11a',

FTRIM='/u/progs/edge2d/data/trim/#'

IPVOID=-1,

&END