

## FIELD

*Field8.f* generates a magnetic field file for Genesis 1.3

The program uses the following input file, which is generated automatically the first time that you run the program.

```
0.8          ! Version number
0.01365      ! Unit length
0            ! Und. type (0/1 is planar/helical)
0            ! Magnet file (0/1 is n/y): not used
3            ! Number of undulator sections
2            ! Undulator Period in unit length
A0           ! Undulator Structure
327 23       ! Number of unit lengths per section
0.846000     ! rms Undulator strength
0 0 0        ! Taper information
0.0          ! rms undulator error
0            ! und. error (2/1/-1/-2), see Genesis
constant     ! Deformation type (constant/parabolic/sinus/sawtooth)
327          ! Deformation length in unit length
0.0          ! Deformation strength (relative)
F0D0        ! Focusing structure
12 23 12 23  ! Length of elements in unit length
10. -10.     ! Quadrupole gradient
0 0          ! Quadrupole offset in x and y (mu m)
0.248        ! Beam energy in GeV
1300.00      ! Beam current
0.600E-05    ! Normalized emittance
0.20000      ! Energy spread in MeV
0            ! Time dependent run (0=no)
0.300E-04    ! Bunch length
```

The version number of for backward compatibility and not used for this program.

The unit length defines the minimum length used in Genesis and is the same as in the Genesis lattice file.

The next 10 lines define the undulator: most of them are the same as in Genesis. The main difference is that the undulator is determined by defining its length in unit lengths rather than in number of undulator periods. In addition, the undulator structure is defined similar to the focusing structure, i.e., with undulator length and drift space (the symbol “A” is again arbitrary, the program only checks for “O” or “0”).

A new feature is long distance random variations. One can change gaps, sawtooth (in case the undulator motor drive doesn’t close the gap correctly), parabolic shape (simulating the stiffness of the support structure). The “sinus” is added as additional anti-symmetric function. The unit length has to be 2 times the undulator period in this case in order to correct the first and second field integral per deformation length: this correction is done only in a very primitive way at the moment. In addition, the features have not been fully checked.

The next 4 lines define the quadrupole focusing structure:

1. First the structure itself is defined: The only symbol known is “0”, referring to a drift space. For the drift space, both the zero and capital “O” are accepted as input. All other symbols are interpreted as quadrupoles.

2. The next line defines the length of each element in unit lengths. The number of elements of both lines has to be the same.
3. The next line defines the strength of the quadrupoles: the drift spaces are automatically set to zero.
4. The last of the 4 lines defines the quadrupole offset. It is the maximum offset as in the standard Genesis input.

All remaining parameters are related to electron beam parameters and are irrelevant here, but they are used in other programs.

Field needs the following additional files:

From Genesis (version of 04-03-11):

The following common blocks: input.cmn, io.cmn, magnet.cmn

The following definition file: genesis.def

The following subroutine files: magfield.f, string.f, math.f

In addition, part of the Genesis "output.f" is taken (called here "varia.f"). If one would take the complete "output.f", additional common blocks etc. would be needed. Furthermore, in the subroutine "last" most of the lines are commented out.

Finally, the IO for this program is contained in parms.f