

GeoFEST 4.6 Input File Format Description

(draft version as of 12/30/04)

The following document describes the input file format for the next (presently pre-release) version of GeoFEST, which includes changes to support the new features of (a) multiple split node fault strand histories, (b) driving with elastic surface tractions, (c) buoyancy reaction forces on specified interfaces. This document contains annotated examples of the correct format and order of the input of all of these features, although an actual useful input file might not contain all of these at once. The description is broken up into “blocks” (delineated by dashed blue lines) to help distinguish different parts of the file from one another.

After the first four blocks, which are unchanged in format from previous versions, the element/material properties information starts. (Note that most of these new 3-d features are currently supported only for tetrahedral elements.) Following the element type ($tet=4$) and **numat** (# of materials), the next three numbers are in order, **numsuf**, **numbuoy**, and **fnnode**. This is the same order in which their respective data blocks appear later, following the element IEN data. **numsuf** is the number of tet facets that have tractions applied. **numbuoy** is the number of groups of facets that have buoyancy forces on them (a separate group for each density contrast surface). **fnnode** is the number of split nodes, as documented in previous versions of GeoFEST.

Following the IEN data, the surface traction block (if present) is simply a block of **numsuf** lines, each consisting of an element number, a facet number (facet #1 is opposite IEN node #1, etc.) and the three vector components of the traction applied to that face. The block is terminated with two zeros.

Next, the buoyancy surface block (if present) consists of **numbuoy** sub-blocks, one for each distinct density contrast interface. Each sub-block begins with a line containing the number of tet facet in that surface, the three unit vector components of the “up” direction for figuring buoyancy on that interface, and the value of $\delta_{density}$ times the acceleration of gravity (in appropriate physical units) for the contrast at that interface. Following that line are the lines containing list of element and facet pairs, again terminated by double zeros.

The last of the three post-IEN blocks is the list of split node specifications, which has one important change from the previous version’s format. In each of the **fnnode** lines, the node number is followed by an integer which identifies the split node as belonging to a particular fault “strand”. Later in the file, this strand ID number will be used to specify different customized slip histories for different faults. Following this in each line, the seven floating point numbers specifying B-vector, S-vector and slip amplitude are given as documented for previous versions. Unlike the other blocks, split nodes are *not* terminated with any special string.

The final time and output control block remains unchanged from previous versions, with the exception of the new parameters for controlling fault slip histories. Following the number of time groups and the parameters controlling matrix reform and backup interval, an integer specifies the number of separate fault strands. Then, at the end of the time/output block, following the list of output times, there is the list of fault history parameters. Each line consists of the strand number, the event repeat time interval, and the time of the first event (no terminating string).

This summarizes the input changes and new features present in the 4.6 version of GeoFEST.

- G. Lyzenga

outputfile.out

This is the first comment line *

File name for main program output

And this is the second comment line *

Preliminary info block

```

22567
3 3 0 1 2
1 0 0 0 0
2 0 1 1 1
3 0 0 0 0
4 0 1 1 1
5 0 1 1 1
.
.
.
22567 0 0 0 0
0 0

```

numnp
of nodes

nrates
of vel. rates

solver
2 = conj. grad.

shape_flag
1 = save in memory

ndof
of degs of freedom

nsd
of space dimensions

bex bey bez
1=free, 0=fixed

Node #

-end block-

Nodal activity codes block

```

1 0 -19.51604 50.00000 -5.36360
2 0 -14.78400 46.76732 -7.89932
3 0 -18.58927 50.00000 -9.30818
4 0 -19.54178 47.30034 -7.50598
5 0 -17.77149 43.95980 -5.40726
.
.
.
22567 0 -50.00000 -18.70732 -8.47848
0 0

```

coordx coordy coordz

Node #

-end block-

Nodal coordinates block

```

0 0

```

-end block-
(no dispbc's)

Nodal specified b.c.'s/velocities block (unused here)

```

1
120019
4 2 18 1 117
35.00 35.00 0.00 0.00 0.00 0.00 0.00
35.00 35.00 350.00 1.00 0.00 0.00 0.00
1 0 1 1061 10643 20682 21885
2 0 1 1061 1062 10643 20682
3 0 1 34 9838 9839 21966
.
.
.
120019 0 1 1 2 3 4
0 0

```

numgroups
#of element groups

numel
#of elements

numat
of material types

type
element type, 4 = tet

nfnodes
of split nodes

numsuf
of surface traction facets

numbuoy
of buoyancy groups

Material properties block

gravx gravi gravz
(body forces)

visc exponent
(viscosity parameters)

Element nodes block (IEN array)

lambda mu
(Lame elastic moduli)

node1 node2 node3 node4
(element node #'s)

material #

element #

-end block-

```

11 1 0.0 0.0 960.0
14 1 0.0 0.0 960.0
27 3 0.0 0.0 960.0
.
.
.
11 1 0.0 0.0 960.0
0 0

```

element #

facet #

tracX tracY tracZ

Surface traction block

-end block-

```

# of facets
288 0.0 0.0 1.0 5.0e-1 rho*g contrast
58 4
59 4 "up" vector
118 4
119 4
178 4 facet #
.
.
.
8639 4
0 0 -end block-

```

Buoyancy surface block
(just one sub-block in this case)

```

1090 1 0.00 0.00 1.00 -0.70711 0.70711 0.000 2.50
1091 1 0.00 0.00 1.00 -0.70711 0.70711 0.000 2.50
1092 2 0.00 0.00 1.00 -0.64279 0.776604 0.000 1.75
.
.
.
1118 2 0.00 0.00 1.00 -0.64279 0.776604 0.000 1.75

```

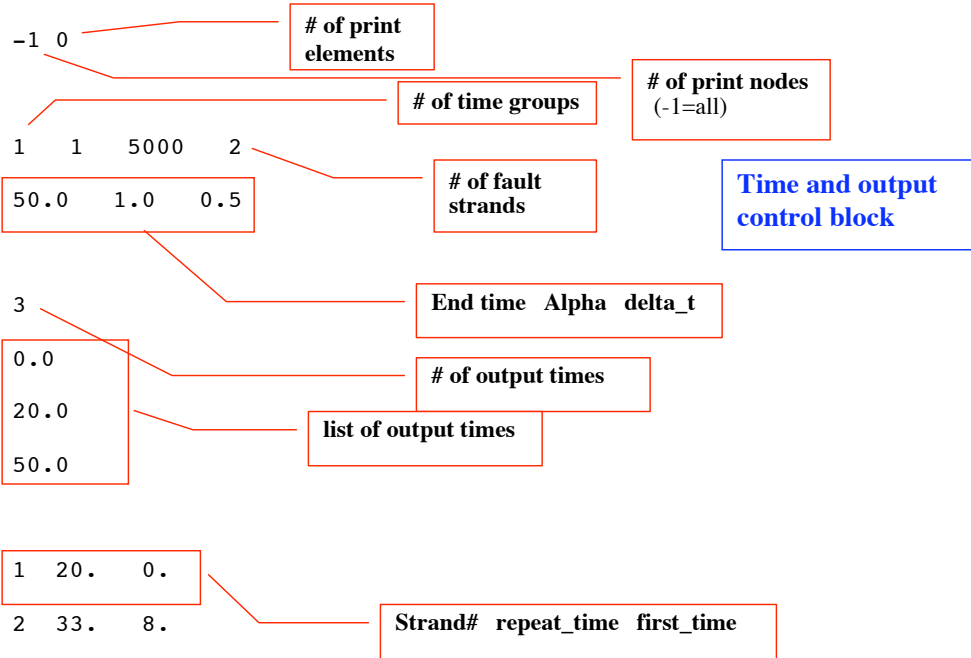
Split node fault block
(not terminated with "0 0")

Fault strand ID #
node #

B vector

S vector

slip amount



NO_RESTART

NO_SAVE

(end of file)