



Chapter 2

Getting Started With Poly3D

What is Poly3d?

Poly3D is a C language computer program written to calculate the displacements, strains and stresses in an elastic whole- or half-space using planar, polygonal-shaped elements of displacement discontinuity. Polygonal elements may have any number of sides, with a minimum of three. Poly3D will calculate these parameters at specified points, or observation grids, that you define.

Geologically, a polygonal element may represent some portion, or all, of a fracture or fault surface as long as displacement discontinuity (joint aperture or fault slip) is constant. You can use more than one element to model a fracture or fault with a non-uniform opening and/or slip distribution. Elements also may be joined together to form a closed surface. Depending on the problem being considered, the enclosed volume may represent either a finite elastic body or a void in an otherwise infinite or semi-infinite elastic body.

This manual will lead you step-by-step through a sample input file. I recommend reading through all of it to understand each part of the input file. This will make it easier for you to adapt Poly3D to your own problems.

Why Do I Need to Use Poly3D?

Poly3D reads the data in the input file, calculates stresses, strains, and displacements, and prints this information to an output file. Both the input file and the output file are text files, so it is not easy to see if you've correctly input the data, nor is it easy to visualize the output data. Sadi Kose (*Fracture Mechanics Group*, University of Wisconsin - Madison) has created a web interface that incorporates a VRML viewer so the input file can be viewed as you input data to verify the problem geology. IRIS Explorer can be used to view your output data. With some minor modifications, it will read your output file and create a 3D model for you to view, manipulate, and print as described in Chapter 4. There are other tools available that can be used with Poly3D, (such as stand-alone mesher) but this manual will focus only on the web interface. Contact Stanford (See *Whom Should I Call?*) for information about the other programs.

What Should I Do First?

Creating an Input File

Input files can be created in any text program, such as wordpad, notebook, jot, etc. If you use the web-based user interface described in this manual, a text file will automatically be created for you with the extension `.in` (e.g. `inputfile.in`). The web-based user interface files can be downloaded from:

```
http://pangea.stanford.edu
```

or by anonymous FTP from:

```
bishop.stanford.edu
```

Before using this interface, be sure you have CGI capabilities on your machine.

Downloading CGI to Your Machine

Sadi Kose (*Fracture Mechanics Group*, University of Wisconsin - Madison) created a user-friendly web interface for the Poly3D input file. To use this form, you will need to have CGI on your home machine.

Do not use the form without downloading CGI to your machine, because it will cause the host machine to run Poly3D. This will mean hard work for our machines and a longer run time for you. Consult with your system administrator about CGI availability.

Running Poly3D

UNIX machines

To run Poly3D, open a system window to get a system prompt, then type `poly3d` at the prompt. Poly3D will automatically read from the standard input and write to the standard output. However, it is a good idea to name the input and output files. If everyone uses the same file names, someone's data is bound to get overwritten. To do this, just include the names of the files with the `poly3d` command. For example, if you type:

```
poly3d -i infile.in -o outfile.out
```

Poly3D will read the input file called `infile.in` and will create a file called `outfile.out` to write the output information to. The filename extensions, `.in` and `.out`, are not automatically added.

Non-UNIX machines

Non-UNIX machines may require a different command to run Poly3D, such as double-clicking on an icon, that makes it difficult to specify command line arguments. Contact Stanford (See *Whom Should I Call?*) for PC interface (Wintel Implementation).