

Manual for Relative focal mechanism Inversion

By Wenhuan Kuang (kuangwh@ustc.edu.cn)

Note: We will continuously update. July 2021.

General Descriptions:

The Relative Focal Mechanism Inversion Demo including source codes and data are provided. Programming languages include C and Fortran. Once successfully complied, one should be able to run the Demo.

Steps to run the Demo:

1. The Demo file contains the following contents:
 - ◆ focal_dd_v1 // the source codes for Relative Focal Mechanism Inversion
 - ◆ green // pre-calculated Green's function utilizing the popular FK code
 - ◆ sac_bp // seismic waveform data after preprocessing
 - ◆ bandpass.pl // a perl script for implementing filtering, for reference
2. Go to source codes folder "focal_dd_v1", key files are:
 - ◆ The main program "focal.c"
 - ◆ The compiler "makefile"
 - ◆ The event and station information file "evinfo_focal"
 - ◆ Other files contain subroutines, header definitions, or intermediate files.
3. In the main program "focal.c", at the beginning of this file, there are lots of parameters to set. For this Demo, you should at least change the path for data and green's function according to your location.

```
// set data path
sprintf(P->datapath, "/data2/kuangwh/DDFM/real_data/m34/Demo/sac_bp");
printf("P->datapath=%s\n", P->datapath);

// set Green's function path
snprintf(Green_name, LENGTH, "/data2/kuangwh/DDFM/real_data/m34/Demo/green/myvel");
```

4. To run the Demo, under the source codes folder "focal_dd_v1", simply type in "make clean" and "make",
 - ◆ If compile succeeds,
Type in "./focal", congratulations, you've successfully run it.
 - ◆ If compile fails,
Open the "makefile" and change the compiler according to your machine.
5. After your successfully run the Demo, you can dive into more details. All parameters for Relative Focal Mechanism Inversion are located at the beginning of the main program "focal.c". Play with it and have fun!

Apply to other dataset:

This may take more efforts, but the main points are listed as follows,

1. Pre-process the data including instrument removal, bandpass filtering, and resampling (for computation efficiency).
2. Calculate the Green's functions using FK code at all distances and depths (not computational intensive by utilizing reciprocity for 1D model).
3. Set the event file and station file accordingly.
4. Test the parameters and run the Relative Focal Mechanism Inversion.

Again, this is the very preliminary version, feedback and comments are very welcomed! Most importantly, we will continuously improve the software to make it user friendly!