Numerical code

This directory contains all the files required to run the Boundary Element Model for viscous fluid filled crack propagation considering a Poiseuille flow.

DYNAMIC CODE

1. One layer

The current version of the code allows to compute different cases, including simulations searching for the velocity that balances the energy budget or imposing a velocity and considering or not a free surface condition. The main program and the associated modules are respectively in the MAIN and MODULES folders. All these cases can be specified in the input file input_BE.dat (see also the inputfile_description.txt)

To compile the main and modules, run the compile_DYKE-CODE_DYN.csh.

The executable will be located in the MAIN folder and can now be copy and paste into the folder for the simulation.

2. Two layers

To consider a density layering, one must compile the main and modules by running compile_DYKE-CODE_DYN_layered.csh.

The main program and the associated modules for the layered crust are respectively in the MAIN and MODULES folders, with *_layered* specified in the file name.

The version is not compatible with a free surface condition as it allows only one analytical discontinuity in the elastic parameters, which is either a free surface or an interface between two layers.

INPUT FILES

The description of the input is gathered in inputfile_description_1layer.txt and inputfile_description_2layers.txt.

RUN A SIMULATION

In the Example_1layer folder, we provide the configuration for the parameters set corresponding to our reference case with the lowest value of fracture energy (see sec. 4.2 and first line of Table S1). For the case of a layered crust, the Example_2layers folder contains the files set for the layered case (see sec. 4.2 and Fig. 3e).

To run a simulation,

1. Set the parameters in *input*/input_BE.dat and in *input*/input_field.dat.
2. Remove all files from *output* folder.
3. Run the chosen executable.

OUTPUT FILES

The description of the output is gathered in outputfile_description_1layer.txt and in outputfile_description_2layers.txt.

IMPORTANT NOTES: In order to run the simulations on a Linux system, gfortran compiler and LAPACK libraries are required.