The programs in this folder are provided as the supplementary material for the paper entitled
**A FEniCS implementation of the phase field method for quasi-static brittle fracture**
submitted to the journal of *Frontiers of Structural and Civil Engineering*.[1]
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**Dependencies**

- FEniCS 2016.1
- matplotlib

**To run a program (command type in python)**

- python programName.py

**Program structure**

- Define the mesh
- Define spaces
- Define simulation parameters and material properties
- Define classes for strain and stress
- Define boundary conditions
- Initialization and definition for weak form
- Define solver
- Run loop for the displacement increment
  - solve the modified elasticity equation
  - update the displacement field
  - solve the phase field equation
  - compute the error in displacement ($\boldsymbol{u}$)
  - compute the error in phase field ($\phi$)
  - iterate if not within the tolerance limit
    - if converged, plots the output data as requested by the user
    - calculate reaction forces (if required) and saves in a text file

**Note:** Data and associated result plots will appear on screen during the run time of the simulation.

[1]The programs may be used, modified by the users without any restrictions. The authors are not responsible for any adverse/beneficial outcomes of using the programs by individuals for any purpose.