Fracture mechanics Tutorials

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Abstract

This document details some tutorials of 'fracture mechanics' module of PSD. These tutorials are not verbose, but does instead give a kick start to users/developers for using PSD's 'fracture mechanics' module.

Parallel 2D

```
PSD_PreProcess -dimension 2 -problem damage -model hybrid_phase_field \
-dirichletconditions 2
```

```
PSD_Solve -np 4 Main.edp -mesh ./../Meshes/2D/tensile-crack.msh -v 0
```

Parallel 3D

```
PSD_PreProcess -dimension 3 -problem damage -model hybrid_phase_field \
-dirichletconditions 2
```

```
PSD_Solve -np 3 Main.edp -mesh ./../Meshes/3D/tensile-crack.msh -v 0
```

Parallel 2D and calculate reactionforce

```
PSD_PreProcess -dimension 2 -problem damage -model hybrid_phase_field \
-dirichletconditions 2 -getreactionforce -reactionforce stress_based
```

```
PSD_Solve -np 4 Main.edp -mesh ./../Meshes/2D/tensile-crack.msh -v 0
```

Parallel 3D and calculate reactionforce

```
PSD_PreProcess -dimension 3 -problem damage -model hybrid_phase_field \
-dirichletconditions 2 -getreactionforce -reactionforce stress_based
```

```
PSD_Solve -np 3 Main.edp -mesh ./../Meshes/3D/tensile-crack.msh -v 0
```

Exercise 1

Optionally try changing -reactionforce stress_based to -reactionforce variational_based for changing the method to extract reaction force, note that stress based method is way faster.

Exercise 2

Optionally try using -useGFP flag with PSD_PreProcess optimized solver

Exercise 3

Add -sequential flag to PSD_PreProcess for sequential solver, but remember to use PSD_Solve_Seq instead of PSD_Solve

Advanced Exercise 1

try the -vectorial flag for vectorial finite element method

Advanced Exercise 2

try the -energydecomp flag for using split of tensile energy

Advanced Exercise 3

try using -constrainHPF flag for using the constrain condition in hybrid phase field model