

# Fracture mechanics Tutorials

## Parallel 2D with 4 MPI processes

Two dirichlet conditions hybrid-phase-field

```
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 with 3 MPI processes

Two dirichlet conditions hybrid-phase-field

```
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 with 4 MPI processes and calculate reactionforce

Two dirichlet conditions hybrid-phase-field

```
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 with 3 MPI processes and calculate reactionforce

Two dirichlet conditions hybrid-phase-field

```
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
```

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

- Optionally try using `-fastmethod` and `-useGFP` flags with `PSD_PreProcess` optimized solver
- Add `-sequential` flag to `PSD_PreProcess` for sequential solver, but remember to use `PSD_Solve_Seq` instead of `PSD_Solve`

## ADVANCE USER

- try the `-vectorial` flag for vectorial finite element method
- try the `-energydecomp` flag for using split of tensile energy
- try using `-constrainHPF` flag for using the constrain condition in hybrid phase field model