|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | Widths for l\_multi = (5, 10, 15, 20, 25, 30) | | | | | |  |
| X | Y | Nx | Ny | Hsize | 5 | 10 | 15 | 20 | 25 | 30 |  |
| 5 | 2 | 250 | 100 | 0.02 | 0.4 | 0.8 | 1.2 | 1.6 |  |  | Uniform inbuilt mesh |
| 5 | 2 | 500 | 200 | 0.01 | 0.2 | 0.4 | 0.6 | 0.8 |  |  | Uniform inbuilt mesh |
| 5 | 0.8 | 625 | 100 | 0.008 | 0.16 | 0.32 | 0.48 | 0.64 |  |  | Gmsh, 3 sectioned mesh |
| 5 | 0.4 | 1250 | 100 | 0.004 | 0.08 | 0.16 | 0.24 | 0.32 | 0.4 | 0.48 | Gmsh, 3 sectioned mesh |

All pressure profiles are taken with a vertical line at X=-1

All stress profiles are taken with a horizontal line at Y = 0.5

Pressure (left) and Stress (right) profiles for all cases of Nx 250 and Ny 100

1. Pressure profiles change but stress profiles do not change with varying kappa
   1. Higher pressure with increasing kappa
2. Magnitude of stresses drop further with an increase in the amount of elements across the phase field.
   1. Note that ellx = 20 corresponds to 80 elements across the full width which is the majority of the total strip width



|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | Widths for l\_multi = (5, 10, 15, 20, 25, 30) | | | | | |  |
| X | Y | Nx | Ny | Hsize | 5 | 10 | 15 | 20 | 25 | 30 |  |
| 5 | 2 | 250 | 100 | 0.02 | 0.4 | 0.8 | 1.2 | 1.6 |  |  | Uniform inbuilt mesh |
| 5 | 2 | 500 | 200 | 0.01 | 0.2 | 0.4 | 0.6 | 0.8 |  |  | Uniform inbuilt mesh |
| 5 | 0.8 | 625 | 100 | 0.008 | 0.16 | 0.32 | 0.48 | 0.64 |  |  | Gmsh, 3 sectioned mesh |
| 5 | 0.4 | 1250 | 100 | 0.004 | 0.08 | 0.16 | 0.24 | 0.32 | 0.4 | 0.48 | Gmsh, 3 sectioned mesh |

Comparing the same overall width of the phase field but with different element size – 0.4 in first row to 0.4 in second row etc

1. Smaller hsize leads to a lower pressure and stress
2. Largest overall width of the phase field gives the lowest stress

 

Part a) corresponds to fourth subplot where hsize = 0.004. For part b) kappa is constant (10) for every figure, what changes is the overall width of the phase field. Legend indicates *elements across the phase field: total width of the phase field*.

1. Overall reinforces the idea that a larger phase field leads to a reduction in the residual stresses
   1. Note that the lowest stress is not feasible

 



Plane Strain vs Plane Stress for Nx250 Ny100 kappa = 10 or hsize = 0.02.

 

