

ME5204 - Finite Element Analysis
deal-ii project : Mukesh V - ME18B156


$$S = 5, M = 6$$

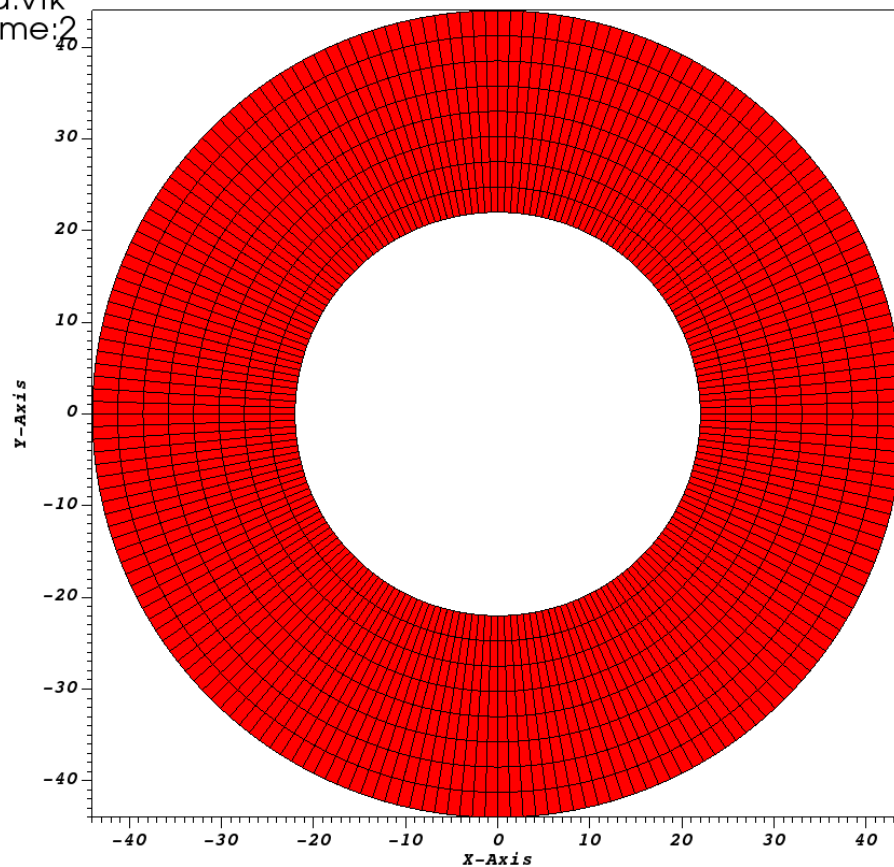
1. Geometry: Hypershell
Dimensions: $(0, 0)$ $r = 22$, $R = 44$, $n_c = 25$
Boundary: 1100
 $L: (5x - 6y)^2$
2. Weak form in last page
3. Number of active cells: 1600
Number of degrees of freedom: 1800
Number of CG Iterations: 104
4. Domain and Mesh

DB: solution-2d.vtk
Cycle: 2 Time: 2

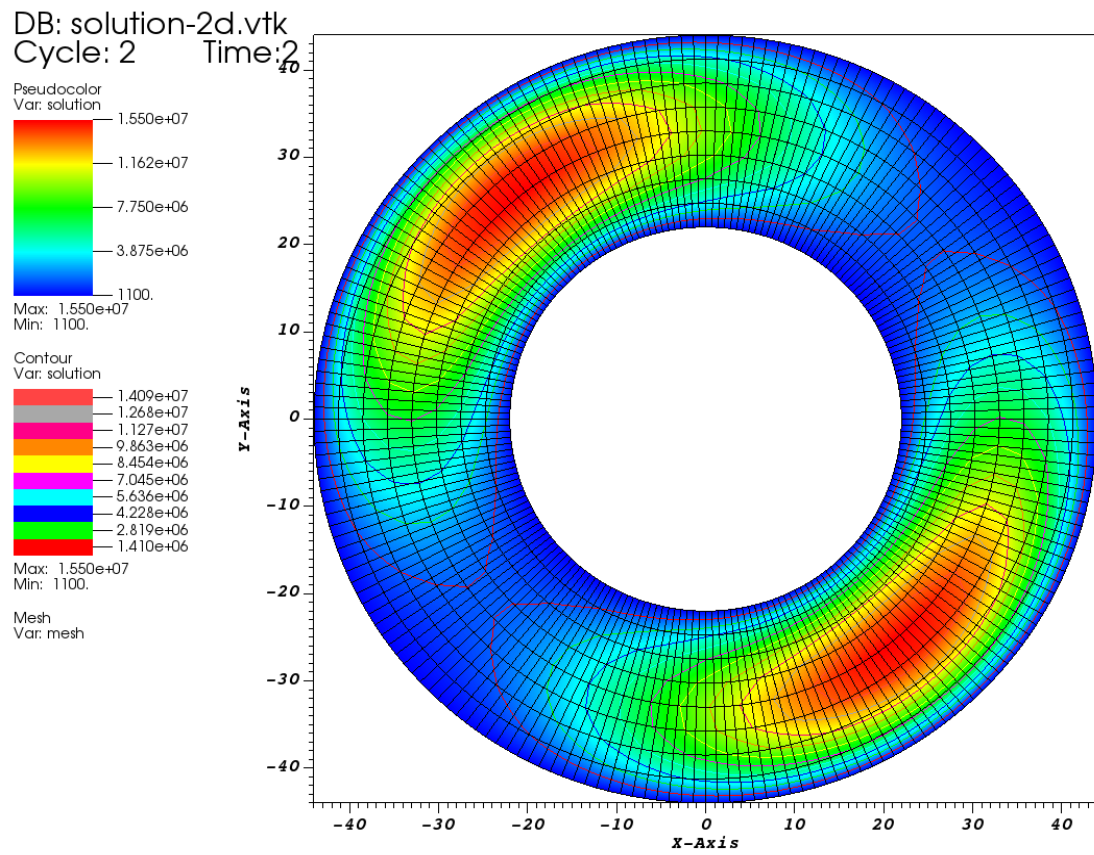
Mesh
Var: mesh

Subset
Var: domains

 0



5. Final results



FEA Project - Weak Form

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$$\nabla^2 u + l = 0, \quad BC = 100(S+M), \quad l = (Sx - My)^2$$

$$\text{Let } \delta = \{u \mid u: \bar{\Omega} \rightarrow \mathbb{R}, u \in H^1, u = BC \text{ on } \Gamma_g\}$$

$$\mathcal{V} = \{w \mid w: \bar{\Omega} \rightarrow \mathbb{R}, w \in H^1, w = 0 \text{ on } \Gamma_g\}$$

$$\int_{\Omega} w(\nabla^2 u + l) = 0$$

$$\text{Green's Identity: } \int_{\Omega} \nabla \cdot (w \nabla u) \, d\Omega = \int_{\Omega} w \nabla^2 u \, d\Omega + \int_{\Omega} \nabla w \cdot \nabla u \, d\Omega$$

$$\int_{\Omega} \nabla w \cdot \nabla u \, d\Omega = \int_{\Omega} w(Sx - My)^2 \, d\Omega + \int_{\Omega} \nabla(w \nabla u) \, d\Omega$$

$$\text{Gauss divergence theorem: } \int_{\Omega} \nabla \cdot F = \int_{\Gamma_h} F \cdot \bar{n} \, d\Gamma \quad \begin{array}{l} \bar{n} = \text{unit} \\ \text{normal} \\ \text{vectors in} \\ \text{Cartesian} \end{array}$$

$$\int_{\Omega} \nabla w \cdot \nabla u \, d\Omega = \int_{\Omega} w(Sx - My)^2 \, d\Omega + \int_{\Gamma_h} w(\bar{n} \cdot \nabla u) \, d\Gamma$$

Since $\Gamma_h = \emptyset$ (not defined in the problem)

Weak Form

$$\int_{\Omega} \nabla w \cdot \nabla u \, d\Omega = \int_{\Omega} w(Sx - My)^2 \, d\Omega$$