

2D Truss design for topology, shape, size, and material (8 points)

Use the 3D truss analysis code provided to you and write a topology optimization code in Matlab for minimizing the mean compliance subject to a volume constraint. Note that you need to first define the ground structure of desired size and an assume topology and ensure that it is statically determinate. Identify some shape variables. The cross-section areas of truss elements should be determined by strength (tensile members) and buckling (compression members). And then, you choose the best material based on the index. Details of this approach are in the following papers:

<https://mecheng.iisc.ac.in/suresh/me260/Handouts/SureshAshby.pdf>

<https://mecheng.iisc.ac.in/suresh/me260/Handouts/RakshitAnanthasuresh2008.pdf>

Whatever method you use to solve the problem, please make it general so that any loading and boundary conditions can be handled if there are two anchored points and forces applied at two degrees of freedom.

- The efficacy of your code should be demonstrated with at least two numerical examples. Only one of them can be the examples given in the above-mentioned papers.
- Include figures and other details of the examples when you submit in paper form. Please also submit your code in one zip file by email.
- **Please name the zip file with your name so that it can be easily traced.**