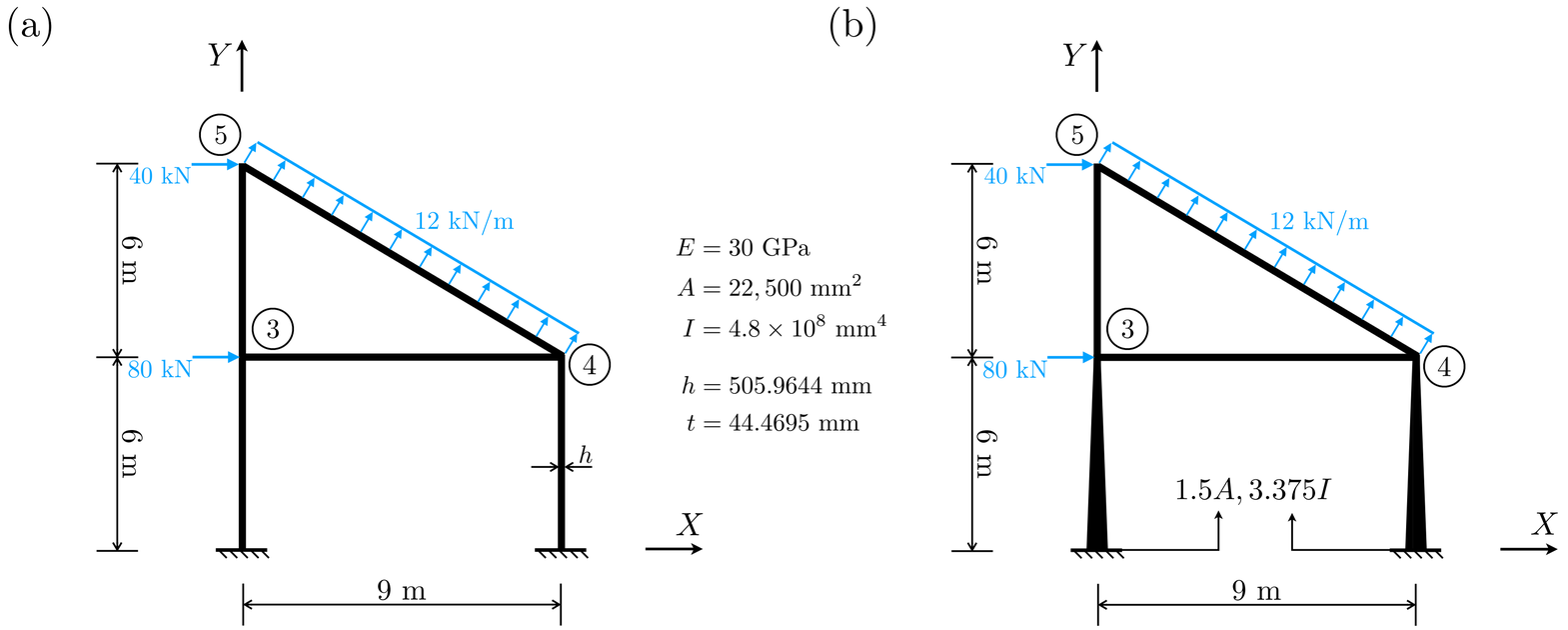
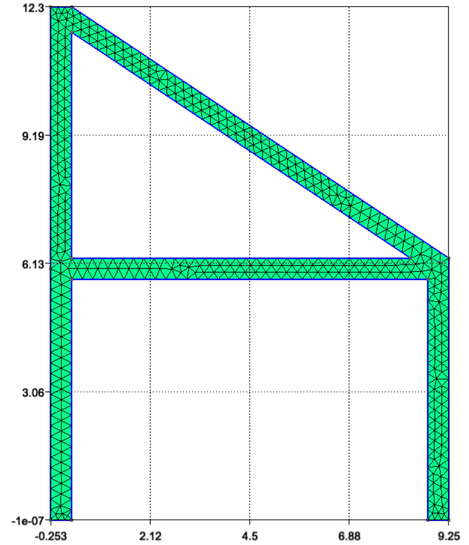
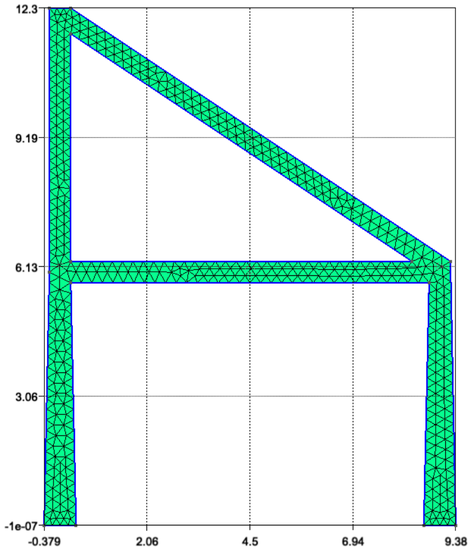
Final project — Plane frame analysis with FEM

Introduction: Model frame structure(s) using CSTs and compare the results with those from MSA analysis.

Directions: Investigate the effect of Poisson's ratio & slender ratio, and explore different frame design strategies.





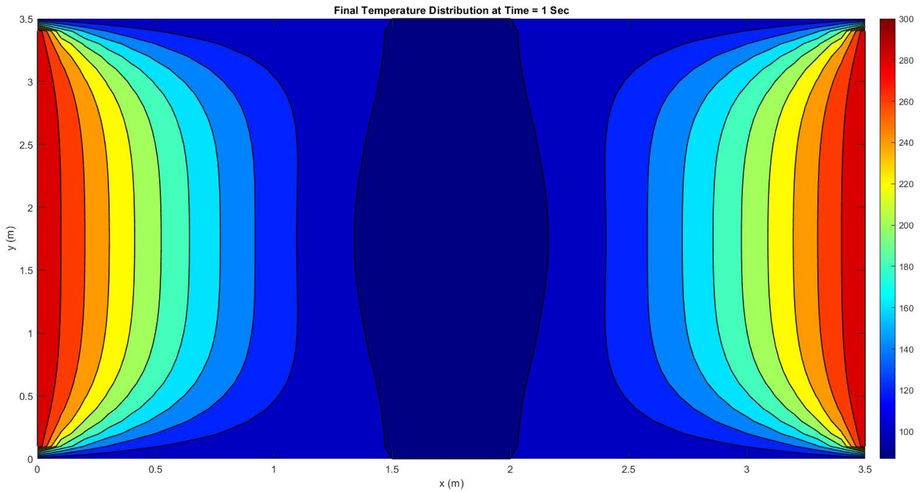


Final project — Heat conduction with FEM

Introduction: Model heat conduction using CSTs in 2D.

Directions: Implement a finite-difference scheme for time integration and integrate it with FEM for the diffusion term.

$$\frac{\partial T}{\partial t} = \alpha \nabla^2 T$$

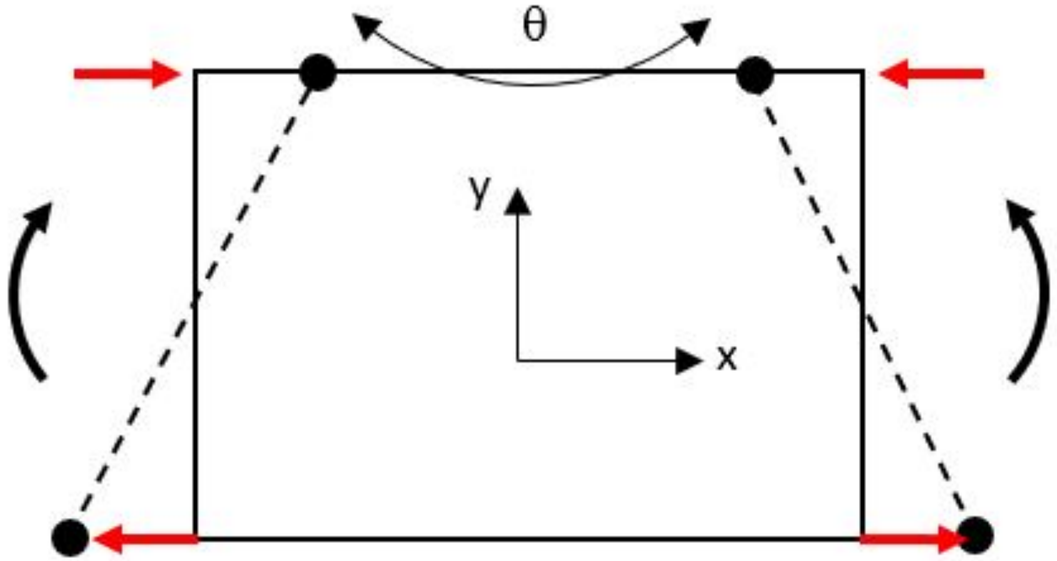


Read more on here

Final project — Shear locking analysis with Quad elements

Introduction: Model cantilever beam bending in 2D with bilinear quad elements

Directions: Implement bilinear quadrilateral elements and investigate their shear locking behaviors in the context of beam bending

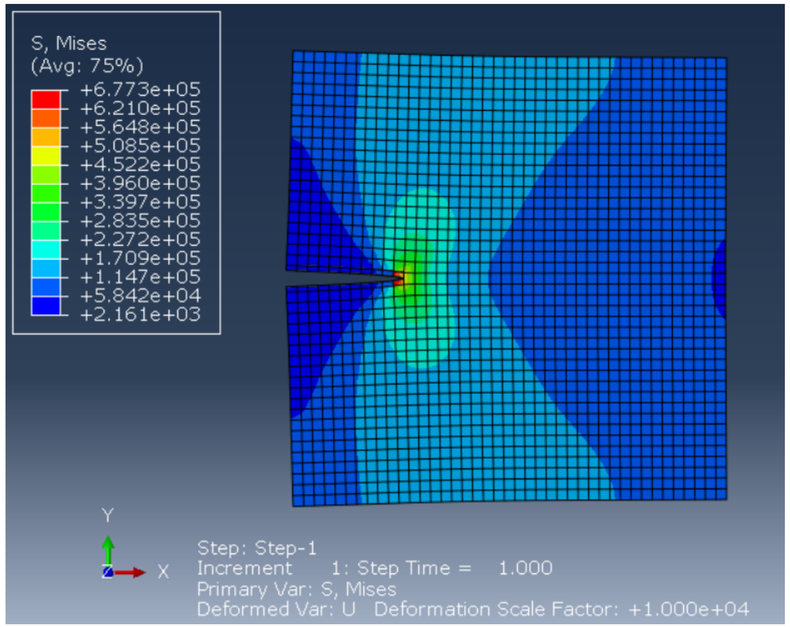


Read more on here

Final project — Linear elastic fracture mechanics with FEM

Introduction: Model classical fracture mechanics problems using CSTs

Directions: Appreciate the convergence to analytical solutions with increasing element number and explore the effect of composite material on the stress intensity near the crack tip



Read more on [here]