ES221-Mechanics of Solids

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Stress Analysis of an Euler-Bernoulli Beam

Problem Statement

We're creating a program to analyze stress in beams. Users will input details like beam type, load positions, and magnitudes, and the program will generate diagrams showing shear and bending forces (SFD and BMD), the beam's deflection, and stress distribution using the Mohr Circle method for any point on the beam.

Objectives

1. Create an easy-to-use interface where the user can input information about the beam type (like cantilever or supported) and details of the loads, such as the magnitude and positions of loads acting on it, and the user can get all the required particulars.
2. Develop algorithms for the Mohr Circle method to calculate reaction forces, shearing forces, bending moments, principal stresses, and shear stresses along the beam.
3. Generate clear and accurate plots showing the Shear Force Diagram (SFD) and Bending Moment Diagram (BMD) based on the calculated stresses using the Mohr Circle method.
4. Create a visual representation of the beam's deflection under the specified loads and parameters the user enters.