

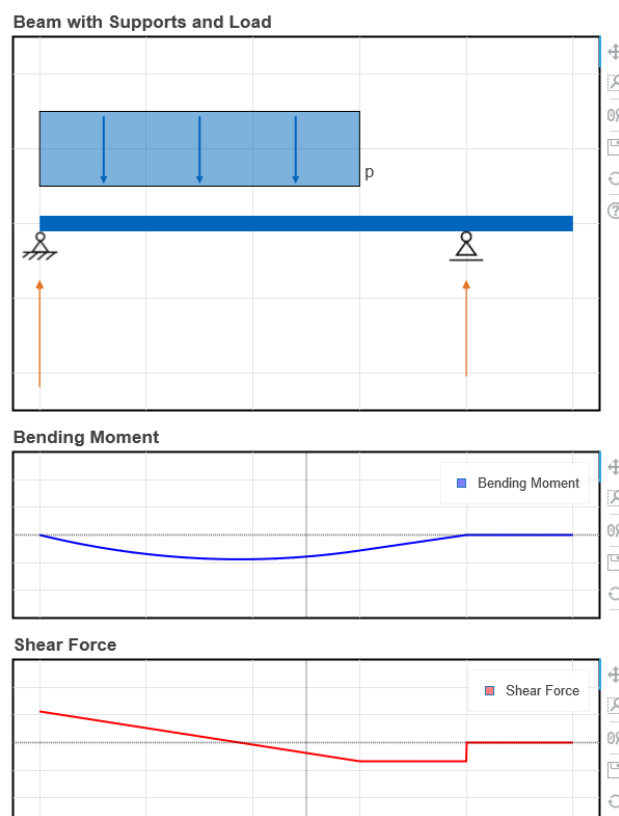
Software Lab:

Interactive web app to visualize differential equations for beams and rods

Setting

The differential equations of the bending beam theory are an essential topic in engineering education. The relation between boundary conditions, loading, inner forces, and deformation are, however, not easily conceivable for students. It is therefore of great interest, to have an interactive web application showing these relations in a descriptive and graphically appealing manner.

The Chair of Structural Mechanics already developed some interactive web apps for teaching purposes (<http://www.bm.bgu.tum.de/lehre/interactive-apps/>). The same concept should now be used to visualize the differential equations for beam and rod systems with arbitrary geometry, boundary conditions, loading, cross sections, and material properties. The user experience of this app, however, is a very important aspect of the project, as undergraduate students should be able to use it without further guidance.



Task

The expected project outcome is a visually appealing and easy-to-use interactive web application. It should be able to:

- Let users design beam and rod systems of arbitrary geometry.
- Provide different boundary conditions (including elastic springs) and loading scenarios.
- Evaluate the analytic expressions of the differential equations.
- Visualize the differential relations.

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References

[1] D. Gross, W. Hauger, J. Schröder, W. A. Wall, and J. Bonet, *Engineering Mechanics 2: Mechanics of Materials*, 2nd ed. Berlin, Heidelberg: Springer Berlin Heidelberg, 2018.