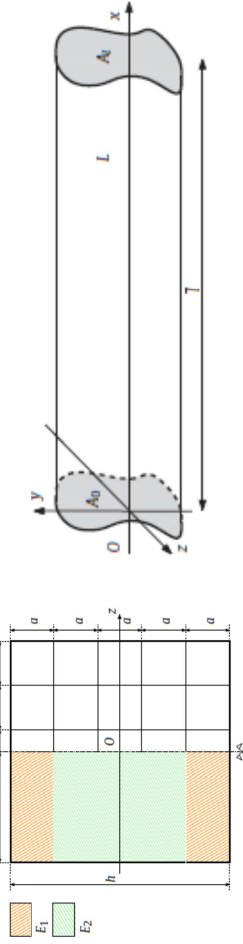


Enhanced 3D beam modeling

Problem: The modeling of structure members is continuously open to new contribution, due to the increasing request of accuracy in structural analysis and the use of new and complex materials. A promising enhanced beam modeling approach and the corresponding FE was recently proposed and the static answer was investigated. Unfortunately the so far mentioned method is strongly limited from heavy assumptions on cross-section geometry.

Objective: Generalize the modeling procedure in order to have the possibility to consider also complex cross-sections without limitations coming from the discretisation procedure. The following aspects may represent independent objective and/or intermediate steps of a bigger work.

1. Formulate a mixed beam model starting from different mixed problem formulations.
2. Develop numerical discretisation procedures that allow to relax hypothesis on cross-section geometry.
3. Evaluate the effects induced by non-homogeneous and/or anisotropic materials.



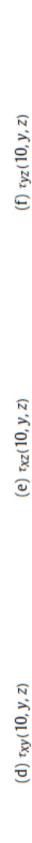
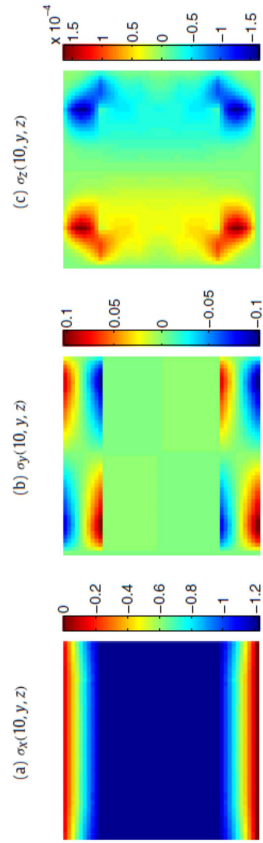
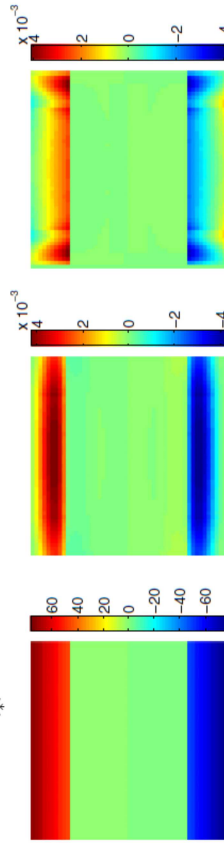
Type: Literature review / Numerical

Prerequisites:

- Knowledge of MATLAB
- Optional knowledge of symbolic software calculus (e.g. MAPLE, MATHEMATICA)

References

- Auricchio F., G. Balduzzi, C. Lovadina *The dimensional reduction modeling approach for 3D beams: differential equations and Finite Element solutions based on Hellinger-Reissner principle.* International journal of solids and structures 2013, 50, 4184-4196
- Dong S.B., J.B. Kosmatka, H.C. Lin *On Saint-Venant's problem for an inhomogeneous, anisotropic cylinder, part I: methodology for Saint-Venant solutions* ASME, Journal of Applied Mechanics 2001, 68, 376-381



Thesis proposal