

Implementation of a third medium contact method in finite element analysis

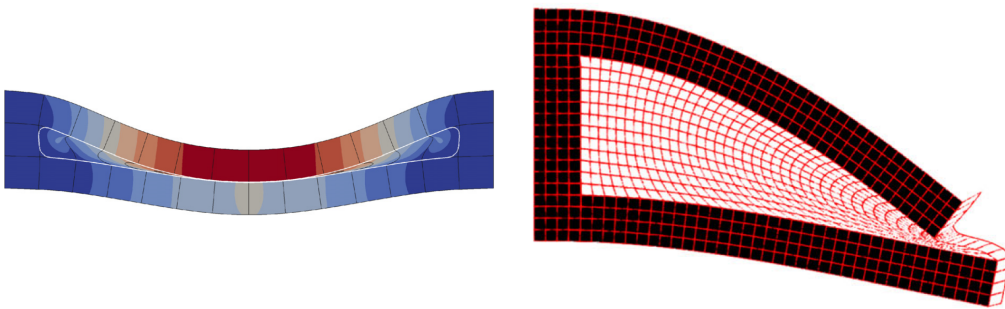


Bachelor or Master's thesis (Computational Methods in Engineering, Maschinenbau, Mathematik)
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Scope of Work

Nonlinear contact problems are important in various fields of science and engineering including crash test, impact problems, and self-contact of cellular materials to mention just a few. A recently proposed idea to model contact is based on the so-called *third medium approach*, where a soft material is placed between the contact pairs. The material model and properties are selected such that the stiffness increases for compression (contact partners are getting closer), while under tension no notable disturbance in the displacement or stress field is induced.

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The main goal of this thesis is to implement a third medium contact approach and to study its performance by means of several benchmark problems. An area of application is seen in the self-contact of cellular materials, e.g., metal foams.

Tasks

- Review of the existing literature on nonlinear solution methods for contact problems
- Familiarize yourself with penalty- and Lagrange multiplier-based contact approaches
- Implementation of a third medium contact solver in an existing in-house FE-code
- Investigations regarding the self-contact of cellular materials

Prerequisites

- Computational mechanics (e.g., (Nonlinear) Finite Element Method)
- Programming skills (preferably Matlab or Julia)
- Continuum Mechanics

