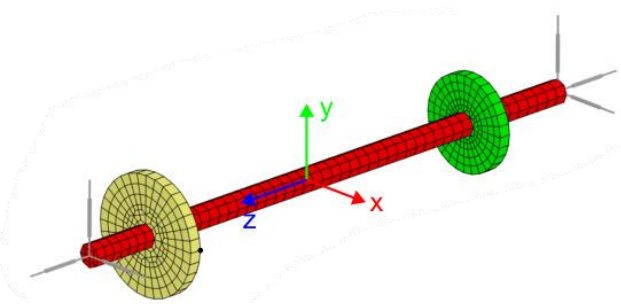
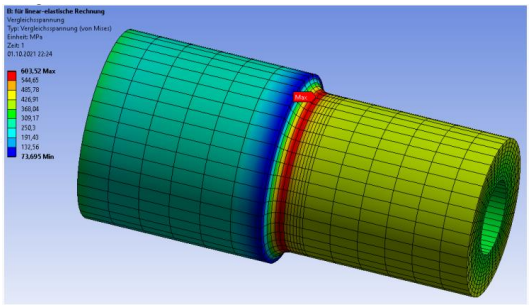
Fatigue Analysis of Multibody System Components

In many engineering applications, system components are subjected to complex loading over time, leading to material fatigue and potential failure. This thesis will investigate methods for integrating fatigue analysis with multibody dynamics simulations, ideally enabling direct prediction of fatigue within nodal-based flexible multibody dynamics simulations.





Your tasks will include:

- Reviewing state-of-the-art fatigue analysis methods in mechanical systems and flexible multibody dynamics
- Building a flexible multibody system in the open-source multibody simulation code Exudyn as a basis for fatigue analysis
- Apply fatigue life prediction techniques based on industry standards (FKM guideline, DIN743, etc.) to asses fatigue (LCF/HCF) of the considered system components, and, if needed, extend existing approaches accordingly
- Validating results through comparison with reference data or literature

What you'll gain:

- Deeper understanding of flexible multibody dynamics
- Deeper understanding of structural durability and fatigue mechanics
- Practical skills in simulation-driven engineering and system dynamics
- Hands-on experience with modern simulation tools (e.g., Ansys, Python, …)
- Depending on the outcome of this thesis, the possibility of writing a scientific paper

Requirements:

- Good knowledge of multibody dynamics and structural mechanics
- Basic knowledge of fatigue analysis
- Good programming/scripting skills with Python
- Hands-on experience with Ansys or Abaqus
- High motivation, commitment, and ability to work independently

We encourage you to apply if you are motivated to work in flexible multibody dynamics and explore fatigue anaylsis!

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