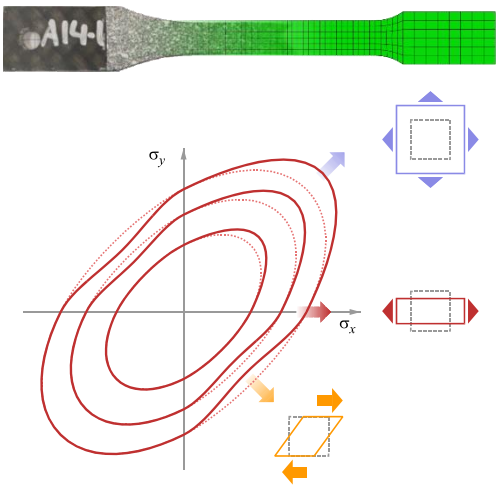
Chair for Computational Mechanics
Department of Geo, Civil and Environmental Engineering
Technical University of Munich

Modeling: ★★★☆☆
Mathematics: ★★★★☆
Programming: ★★★★★
Science: ★★★☆☆

Software Lab:

A tool box for material characterization

Setting



A correct material description of the underlying material in the FE simulation is a key enabler to use the full lightweight potential of different alloys such as magnesium or aluminum. In order to fully cover the complex behavior of an elasto-plastic crashworthiness simulation an elaborate experimental program has to be conducted, covering asymmetric hardening behavior in tension-compression, anisotropic hardening and strain rate dependency for both hardening and fracture among others.

The evaluation and extraction of the material parameters from raw experimental results is a tedious task. The creation of a toolbox to extract this data from raw experimental input will help to facilitate this task enabling the user to focus on the essential task to compare and evaluate the test results and concentrate on the correct material description.

The integration of an optimization routine in order to find not only the best parameters for a material law of a solver such as LS-Dyna or Abaqus but also the best material description which allows to fully depict the behavior, will be your last task.

Task

Create a tool box containing

- Evaluation of big amounts of experimental test results and storing them in a database
- Visualization and comparison results from different experiments as well as materials
- Integration of an optimization routine for the parameter fitting for predefined material models

Supervisors

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References

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[2] H. Hooputra. H. Gese, H. Dell and H. Werner, A comprehensive failure model for crashworthiness simulation of aluminium extrusions, International Journal of Crashworthiness, vol. 9, pp. 449-464, 2004