TECHNISCHE UNIVERSITÄT DRESDEN

D³ GRK 2868

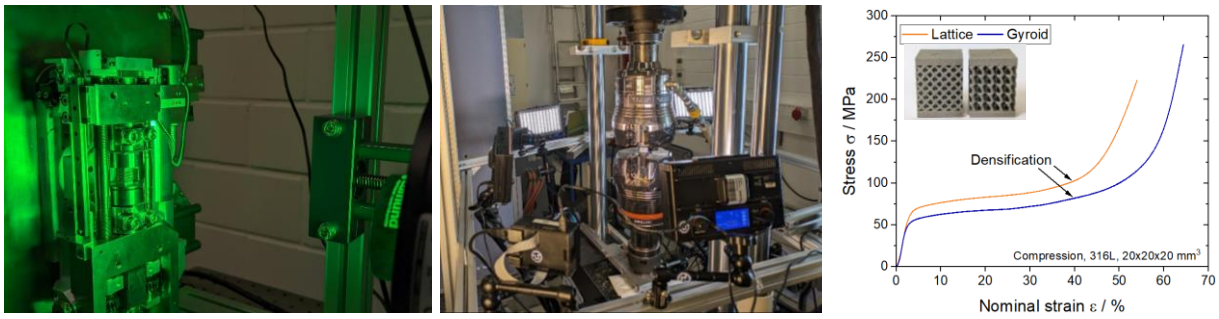
Research Training Group 2868
D³ - Data-Driven Design of Resilient Metamaterials

Offer for a Student Assistant Position

Experimental Characterization of the Damage Behavior in Mechanical Metamaterials

Mechanical metamaterials are rationally designed structures with effective mechanical properties that extend beyond the capabilities of their constituent material. Their mechanical properties depend on both the internal microstructure of the material itself and the mesoscopic morphology of the metamaterial. This allows for new and unique properties (e.g. adapted stiffness, high specific strength and damage tolerance) that cannot be achieved with the constituent material alone.

This project focuses mainly on spinodoid metamaterials, which exhibit high damage tolerance and a great design freedom due to their nonperiodic, seamlessly curved morphology. These novel metamaterials are distinguished by their complex deformation behavior and have been very sparsely researched until now. In-situ characterization methods (e.g. Digital Image Correlation) will be used to investigate their deformation behavior and damage mechanisms under quasi-static and cyclic loading.



a) b) c)

Fig. 1: a) 2D-DIC setup using a tensile & compression module for testing of small-scale samples, b) 3D-DIC setup for compression testing of mechanical metamaterials, c) Stress-strain response of different additive manufactured metamaterials under quasi-static compressive load

Tasks:

- Assistance and evaluation of mechanical tests using in-situ characterization techniques (e.g. Digital Image Correlation (DIC), Thermography)
- Optical Microscopy / Scanning Electron Microscopy (Fractography)
- Metallographic work
- Research support
- Possibility of writing the project paper and final thesis

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