



# BACHELOR/MASTER THESIS

## At the Center for Structural Materials

### Requirements:

Study of materials science or mechanical engineering,

Independence, data valuation and processing

First experience with Python is of advantage

### Faculty:

TU Darmstadt

MPA-IfW

High-Temperature Materials

### Kontakt:

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### Start:

Immediately

### Posting:

10.01.2024

### Note:

This thesis is also eligible for crediting in Aerospace Engineering.

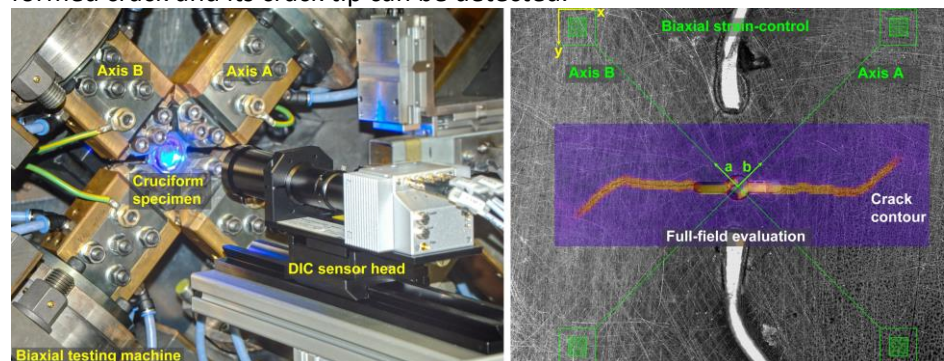
## Digital image correlation

### Automatic crack path detection in biaxially loaded specimen

#### Background

Digital image correlation is a modern measuring method for determining deformations and strains in material testing. These are calculated by comparing images of the undeformed and deformed state of a test specimen.

In cooperation with the Fraunhofer IPM, the MPA-IfW is working on a new type of camera system for the strain-controlled conduction of aerospace alloy fatigue tests. Using the DIC method, strains can be determined so that a formed crack and its crack tip can be detected.



Due to the random orientation of the cracks, crack tip detection currently still requires manual post-processing. The aim of this thesis is therefore to develop an algorithm in Python that can find the crack tip using existing strain data from a test sample and reproduce the course of the crack in a robust manner.

#### Task

- Literature research on fracture mechanics and DIC
- Learning DIC algorithms in Python
- Comparing DIC algorithms
- Validation of the algorithm

#### Objectives

- Development of a crack detection algorithm
- Automatic crack tip detection within set uncertainty
- Automatic crack length calculation within set uncertainty