

Bachelor / Master Thesis or Semester Project

Finite element simulation of instrumented indentation testing considering crystal plasticity

Background

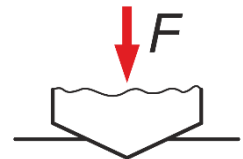
Instrumented indentation testing is a technique similar to conventional hardness testing, but more powerful. The recorded force-displacement curve can be used for the characterization of a multitude of mechanical properties. Measurements can be taken at different scales, ranging from single phases / grains to several hundreds of grains.

Aim

The indentation procedure shall be simulated using the finite element (FE) method and crystal plasticity (CP), i.e. the consideration of a group of grains, each with directional properties. The influence of simulation parameters (e.g. size of simulated volume, element size etc.) and measurement parameters (e.g. size of indenter, grain orientation, number of deformed grains) shall be studied systematically.

Tasks

- Literature study on indentation and crystal plasticity
- Setup of simulations in Abaqus or similar FE software
- Sensitivity study of simulation parameters
- Study of influence of measurement parameters



Your profile

- Experience with FE software
- Knowledge of materials science and mechanics
- Interest in FE simulations & materials testing
- Self-reliance, reliability, thoroughness



From: <https://doi.org/10.1016/j.commatsci.2018.04.030>

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