

Master's Thesis Proposal

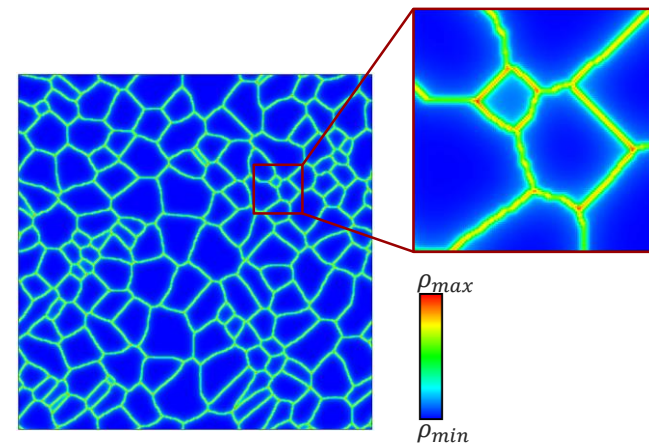
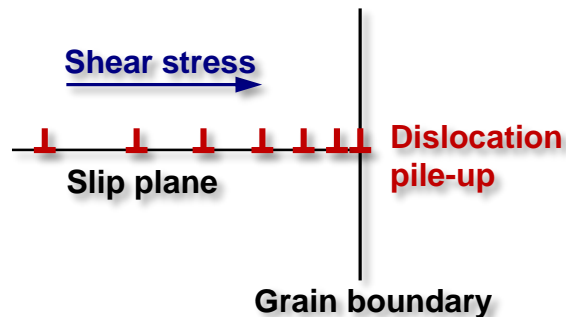
Reaction-Diffusion Modeling of Dislocations

Background

In metals, *dislocations* (imperfections in the crystal lattice) are central to plastic deformation of the material. The distribution of the dislocations in the material microstructure and the formation of dislocation patterns have a major impact on the material properties. One effect is the classical Hall-Petch relation, whereby smaller crystals give a harder material. This is related to dislocation pile-ups at the grain boundaries.

Project

This project will use a so-called *reaction-diffusion* approach to model the stability of the dislocation distribution in metal microstructures and the formation of dislocation patterns. The modeling will be performed using finite difference and/or finite element methods. The project is directly linked to ongoing research



References

- H. Hallberg and M. Ristinmaa (2013), *Microstructure evolution influenced by dislocation density gradients modeled in a reaction-diffusion system*, Computational Materials Science, 67:373-383

