

Master's Thesis Proposal

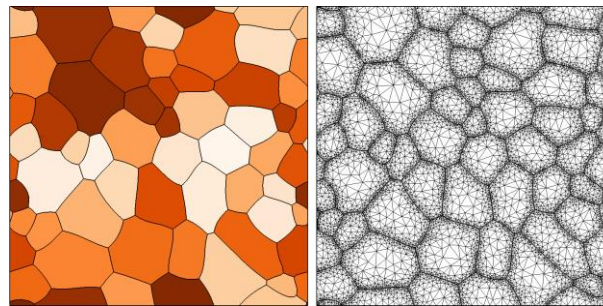
Physics-Based Mesh Adaption

Background

Microstructure changes in metals is mainly due to the movement of interfaces, such as grain boundaries. To trace the interface evolution a very fine mesh is required. However, using a very fine mesh everywhere will be too computationally expensive. The solution is an *adaptive mesh* which is continuously adapted to the moving interfaces.

Project

This project will consider microstructure physics such as interface curvature and gradients in the fields which move the interfaces to control the mesh size in critical regions. The interfaces will be modeled by so-called *level sets*. A Fortran-based finite element implementation of level sets exists and the project will focus on improving the meshing algorithm. The project is directly linked to ongoing research



References

- H. Hallberg (2014), *Influence of anisotropic grain boundary properties on the evolution of grain boundary character distribution during grain growth - A 2D level set study*, Modelling and Simulation in Materials Science and Engineering, 22(8):085005
- H. Hallberg (2013), *A modified level set approach to 2D modeling of dynamic recrystallization*, Modelling and Simulation in Materials Science and Engineering, 21(8):085012

