

Mini Thesis/Bachelor Thesis/Master Thesis

Mesoscopic Finite Element Modelling of the Microstructure for WC-Co Hardmetal

Task description

It has been well accepted that mechanical properties of WC-Co hardmetal strongly depend on its microstructure. The proposed thesis will focus on the finite element (FE) modelling of the microstructure for WC-Co hardmetals at the mesoscale. An already developed tool with Matlab for artificial representative volume element (RVE) generation will be evaluated by characterizing microstructural morphology like WC grain size (d_{WC}), WC grain orientation, Co volume fraction (V_{Co}), Co mean free path, etc. After converting the computer graphics to corresponding CAE models in FE software Abaqus, a series of homogenization studies will be conducted on generated RVE models to discuss proper parameters during the parametric modelling process.

Assignment

- Development and application of the RVE generation tool
- Homogenization study with finite element method

Qualification

- Ability to work independently
- Knowledge on materials science
- Skill on Matlab and Python programming
- Skill on FE software Abaqus

We offer

- Good and flexible work environment
- Timely completion of the thesis

Contact

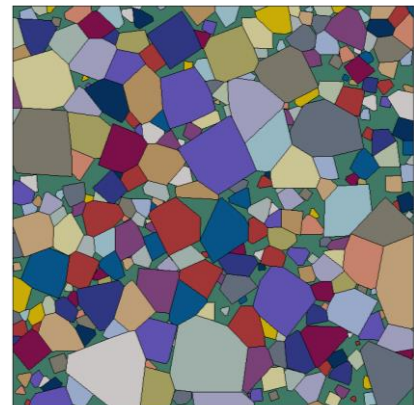
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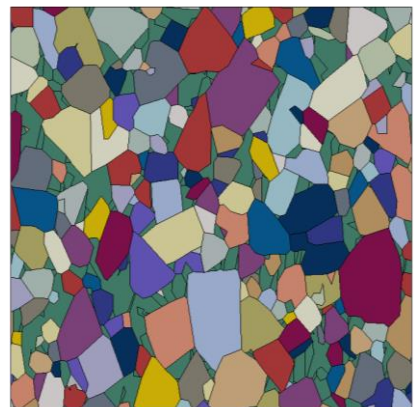
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Artificial 15x15 µm RVE
with $V_{Co}=13.12\%$, $d_{WC}=0.68\ \mu\text{m}$



Realistic 15x15 µm RVE
with $V_{Co}=15.49\%$, $d_{WC}=0.77\ \mu\text{m}$