

Recent results on a phase field model for alloy solidification

Björn Stinner, Regensburg

Based on the principle of irreversible thermodynamics, a diffuse interface model for solidification of alloys has recently been developed. Balance equations for the conserved quantities energy and components are coupled to evolution equations for phase field variables describing the phases, grains, and interfaces.

In some applications it is more convenient to use the temperature and the chemical potentials as variables instead of the conserved quantities. The reduced grand canonical potential (rgcp) is presented as a suitable thermodynamic quantity to reformulate the model.

Certain growth properties of the rgcp make it challenging to show existence of weak solutions to the parabolic differential equations governing the evolution. At most linear growth in the chemical potentials is considered as well as a logarithmic term in the inverse temperature.