

Multiscale decomposition of dislocation microstructures

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Abstract

Dislocations are topological defects in crystals which generate long-range elastic stresses. We consider a model in which the elastic interactions are represented via a singular kernel behaving as the $H^{1/2}$ -norm of the slip. We obtain a sharp-interface limit within the framework of Gamma convergence. One key ingredient is a proof of the fact that the presence of infinitely many equivalent length scales gives strong restrictions on the geometry of the microstructure. In particular we show that the microstructure must be one-dimensional on most length scales, and that only few are available for the relaxation. This talk is based on joint work with Adriana Garroni and Stefan Müller.