

FUNDAMENTAL CONTRIBUTIONS TO THE CONTINUUM THEORY OF EVOLVING PHASE INTERFACES IN SOLIDS pdf

1: Morton E. Gurtin (Author of An Introduction to Continuum Mechanics)

This book addresses the physics of phase transitions in chemical compositions and crystal or molecular structures. It deals with the control of the scale and distribution of microstructural features that are associated with different phases.

Related Papers Low angle grain boundaries can be modeled as arrays of line defects dislocations in crystalline materials. The classical continuum models for energetics and dynamics of curved grain boundaries are mainly based on those with equilibrium dislocation structures without the long-range elastic interaction, leading to a capillary force proportional to the local curvature of the grain boundary. The new continuum model recently derived by Zhu and Xiang *J. Solids*, 69,, incorporates both the long-range dislocation interaction energy and the local dislocation line energy, and enables the study of low angle grain boundaries with non-equilibrium dislocation structures that involves the long-range elastic interaction. Using this new energy formulation, we show that the orthogonal network of two arrays of screw dislocations on a planar twist low angle grain boundary is always stable subject to both perturbations of the constituent dislocations within the grain boundary and the perturbations of the grain boundary itself. Dislocation , grain boundary , continuum model , calculus of variations , stability. Yang Xiang, Xiaodong Yan. Stability of dislocation networks of low angle grain boundaries using a continuum energy formulation. Bulatov , Enabling strain hardening simulations with dislocation dynamics, *Modell. Oh* , The Sobolev inequality on the torus revisited, *Publicationes mathematicae*, 83 , Frank, The resultant content of dislocations in an arbitrary intercrystalline boundary, in *Symposium on the Plastic Deformation of Crystalline Solids*, Office of Naval Research, Pittsburgh, , [5] N. Sun , Parametric dislocation dynamics: A thermodynamics-based approach to investigations of mesoscopic plastic deformation, *Phys. B*, 61 , Hebey, *Nonlinear Analysis on Manifolds: Devincre* , Dislocation microstructures and plastic flow: Haataja , Low-angle grain boundary migration in the presence of extrinsic dislocations, *Acta Mater.* Srolovitz , Stress-driven migration of simple low-angle mixed grain boundaries, *Acta Mater.* Srolovitz , Loss of interface coherency around a misfitting spherical inclusion, *Acta Mater.* Shockley , Dislocation models of crystal grain boundaries, *Phys. Symmetrical tilt boundaries*, *Philos. A* , , Xiang , Modeling dislocations at different scales, *Commun. E* , A level set method for dislocation dynamics, *Acta Mater.* Xiang , Energy of low angle grain boundaries based on continuum dislocation structure, *Acta Mater.* Xiang , Stabilizing force on perturbed grainboundaries using dislocation model, *Scripta Mater.* Xiang , Continuum framework for dislocation structure, energy and dynamics of dislocation arrays and low angle grain boundaries, *J. Solid*, 69 , The net effect is making the upper grain rotate in the counterclockwise direction with respect to the lower grain.

2: David Kinderlehrer (Author of An Introduction to Variational Inequalities and Their Applications)

Fundamental Contributions to the Continuum Theory of Evolving Phase Interfaces in Solids A Collection of Reprints of 14 Seminal Papers. Editors: Ball, J.M.

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