

Variational Methods for Crystal Defects and Plasticity

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Abstract: Dislocations are one dimensional defects in crystals, which move, interact, and form very complex structures. Their collective behaviour provides a fundamental mechanism for plastic deformation in metals. The mini-course will give an overview of some important semi-discrete or discrete model for dislocations and will focus on their multi-analysis in terms of Γ -convergence. These models are characterized by the presence of topological singularities and are a source of many challenging mathematical questions. The rigorous analysis produces improved mesoscopic and macroscopic models and highlights the occurrence of interesting effects, as pinning or microstructure.