

## **A variational model for dislocations**

*Adriana Garroni*

Dislocations are line defects which are present on slip planes of crystals and are considered responsible for many interesting phenomena, like plasticity and hardening. Those defects can be described by a multi-phase field variational model recently introduced by Koslowski and Ortiz. This is a 2d vector phase-transition functional, with a non local singular perturbation and a non linear potential which vanishes on a lattice. We describe, by means of  $\Gamma$ -convergence, the asymptotic behaviour of these functionals as the lattice parameter goes to zero and we obtain, in the limit, an anisotropic line tension energy. The anisotropic line tension energy density can be completely described in the scalar case (where the scalar phase describe the activation of one slip system in the slip plane) and exhibits a one dimensional character (i.e. the optimal profile is one dimensional), while in the vector case we can show by means of explicit construction that the optimal transition may produce oscillations.