On the regularity of a phase field constrained system

José Francisco Rodrigues, Coimbra and Lisboa

The phase field approach for multi-phase systems leads to consider diffusion problems for the vector order parameter under constrains of the Gibbs simplex type. For certain potentials, these problems may be considered as special cases of a class of parabolic variational inequalities associated with convex sets defined by a system of obstacle type constraints. Under natural assumptions on these constraints, we use the Lewy-Stampacchia inequalities together with a simple iteration argument to show that the regularity of the solution is the same as the one corresponding to linear parabolic systems of second order. Special cases of constraints for ternary mixtures, for a system of two grains and for a diffuse interface model for simultaneous order-disorder and phase separation illustrate those estimates.

This is joint work with Lisa Santos.