Recent results on analysis and optimal control of phase field models

Optimal distributed control of a nonlocal convective Cahn-Hilliard equation by the velocity in 3D

Jürgen Sprekels

Department of Mathematics, Humboldt-Universität zu Berlin and WIAS Berlin

sprekels@wias-berlin.de

Abstract: In this lecture, which reports joint work with E. Rocca (WIAS Berlin), we study an optimal control problem for a nonlocal convective Cahn–Hilliard system describing a phase separation process in a fluid in a three-dimensional container. Since the velocity of the fluid flow acts as the control, the interaction between control and state is nonlinear. We establish well-posedness results for the state equation and show that the control-to-state mapping is Fréchet differentiable between suitable Banach spaces. The associated adjoint systems turns out to be uniquely solvable and can be used to derive the first-order necessary optimality conditions.