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Optimal boundary control problems for Cahn-Hilliard systems with singular potentials and dynamic boundary conditions

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Abstract: Viscous and nonviscous Cahn-Hilliard systems are often used as models for phase separation processes in applications. Usually, they are combined with no-flux boundary conditions for order parameter and chemical potential. In this lecture, we assume the presence of diffusive processes on the boundary surface, which leads to a dynamical boundary condition for the order parameter in which the Laplace-Beltrami operator occurs. Both in the bulk and on the boundary singular nonlinearities of logarithmic type arise, which render the analysis difficult. We present in this lecture recent results concerning the optimal boundary control of such systems. Standard results like existence, Frechet differentiability of the control-to-state mapping, first-order necessary and second-order sufficient optimality conditions can be obtained. We also brieflycomment on the case when the nonlinearities are of subdifferential type.