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The SAV method for phase-field models with dynamic boundary conditions

Important qualitative features of two-phase systems related to phase separation processes can be described by Cahn-Hilliard-type equations. For these equations, many different boundary conditions are available. While the simplest boundary conditions dictate a static contact angle and prevent flux across the boundary, more sophisticated models use additional partial differential equations to describe effects like dynamic contact angles or mass transfer across the boundary.

Recently, a family of models postulating Cahn-Hilliard type equations on the domain boundary to describe adsorption processes was analyzed (cf. Knopf, Lam, Liu, M., M2AN, 2021). This family includes the case of instantaneous adsorption processes studied by Goldstein, Miranville, and Schimperna (Physica D, 2011) as well as the case of vanishing adsorption rates which was investigated by Liu and Wu (Arch. Ration. Mech. Anal., 2019).

In this talk we will discuss the properties of these models and address their numerical treatment. Using the scalar auxiliary variable method introduced by Shen, Xu, and Yang (J. Comp. Phys., 2018), we derive fully a discrete, unconditionally stable, linear finite element scheme. Based on the stability of the proposed scheme we are able to establish convergence of the discrete solutions.

Ort: Mathmatik Ost, 40.03.003/Zoom   Zeit: Donnerstag, 19.01.2023 um 14:15 Uhr

You are cordially invited to this lecture. Request the Zoom link from anja.schloemerkemper@mathematik.uni-wuerzburg.de

gez. Anja Schlömerkemper