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*Existence of weak solutions for a diffuse interface model for a two-phase flow with degenerate mobility*

(in collaboration with Helmut Abels and Harald Garcke)

We show the existence of weak solutions for a diffuse interface model for incompressible two phase flows with different densities in the case of a degenerate mobility. The model was derived recently by Abels, Garcke and Grün and is the first one for different densities which allows for an energy estimate, so that we speak of a thermodynamical consistent model.

We give a definition of weak solutions in this case and show existence for finite times. To this end we approximate the homogeneous free energy density by a singular one and the mobility by a positive function. For the approximated equations we apply an existence result from a recent work of Abels, Depner and Garcke. By making use of careful estimates for the subgradient of a certain energy from a work of Abels and with the help of a suitable testing procedure, we can finally pass to the limit in the approximation.