Navier-Stokes-Korteweg models and the sharp-interface limit

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A standard approach to model the dynamics of liquid-vapour flows is the coupling of incompressible models for the liquid phase with compressible models for the vapour phase using a free boundary at the position of the phase transition. However there are many examples of phase-transition phenomena that require the fully compressible modeling of both phases (e. g. cavitation problems or bubble oscillation). The class of Navier-Stokes-Korteweg systems provides fully compressible models. We review these models, present the basic analytical results, and a number of numerical experiments. In the final part of the talk we consider the sharp-interface limit of vanishing viscosity and capillarity which leads to first-order systems of mixed hyperbolic-elliptic type.