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**Phase-field simulation of gas bubble growth and flow in a Hele-Shaw cell** YING SUN, CHRISTOPH BECKERMANN, Dept. of Mechanical and Industrial Engineering, University of Iowa — A diffuse interface model has been developed for gas bubble growth and dynamics in a supersaturated liquid. The liquid becomes supersaturated in the gas species because of a drop in the pressure or temperature. The bubbles grow by gas diffusion in the liquid towards the bubble interfaces. During bubble growth, flows are induced by the large density contrast between the phases. The bubbles coarsen due to surface tension effects. The process widely exists in biological systems, materials processing, oil recovery, and other applications. The flows in the gas and liquid phases are solved using a diffuse interface model for two-phase flows with surface tension, phase change, and density and viscosity differences between the phases. This diffuse-interface model for flow is coupled with a phase-field equation for calculating the interface motion, and a species conservation equation for the gas transport. The model is validated for a single bubble growing inside a semi-infinite liquid, and convergence of the results with respect to the interface width is demonstrated. Large-scale numerical simulations for multiple bubbles inside a Hele-Shaw cell reveal the presence of complex interface dynamics and flows. The bubble dynamics, including coarsening and coalescence, are investigated as a function of the initial gas concentration, surface tension, and the density and viscosity contrasts between the phases.

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