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A phase-field point-particle model for particle-laden interfaces CHUAN GU, LORENZO BOTTO, School of Engineering and Materials Science, Queen Mary University of London — The irreversible attachment of solid particles to fluid interfaces is exploited in a variety of applications, such as froth flotation and Pickering emulsions. Critical in these applications is to predict particle transport in and near the interface, and the two-way coupling between the particles and the interface. While it is now possible to carry out particle-resolved simulations of these systems, simulating relatively large systems with many particles remains challenging. We present validation studies and preliminary results for a hybrid Eulerian-Lagrangian simulation method, in which the dynamics of the interface is fully-resolved by a phase-field approach, while the particles are treated in the "point-particle" approximation. With this method, which represents a compromise between the competing needs of resolving particle and interface scale phenomena, we are able to simulate the adsorption of a large number of particles in the interface of drops, and particle-interface interactions during the spinodal coarsening of a multiphase system. While this method models the adsorption phenomenon efficiently and with reasonable accuracy, it still requires understanding subtle issues related to the modelling of hydrodynamic and capillary forces for particles in contact with interface.

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