

Abstract Submitted
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Physics, mathematics and numerics of particle adsorption on fluid interfaces MARKUS SCHMUCK, Department of Chemical Engineering, Imperial College London, GRIGORIOS A. PAVLIOTIS, Department of Mathematics, Imperial College London, SERAFIM KALLIADASIS, Department of Chemical Engineering, Imperial College London — We study two arbitrary immiscible fluids where one phase contains small particles of the size of the interface and smaller. We primarily focus on charge-free particles with wetting characteristics described by the contact angle formed at the interface between the two phases and the particles. Based on the experimental observation that particles are adsorbed on the interface to reduce the interfacial energy and hence the surface tension as well, we formulate a free-energy functional that accounts for these physical effects. Using elements from calculus of variations and formal gradient flow theory, we derive partial differential equations describing the location of the interface and the density of the particles in the fluid phases. Via numerical experiments we analyse the time evolution of the surface tension, the particle concentration, and the free energy over time and reflect basic experimentally observed phenomena.

Serafim Kalliadasis
Department of Chemical Engineering,
Imperial College London, London SW7 2AZ, UK

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