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Particle-laden interfaces: direct calculation of interfacial stress from a discrete particle simulation of a pendant drop[1] CHUAN GU, LORENZO BOTTO, Queen Mary Univeristy of London — The adsorption of solid particles to fluid interfaces is exploited in several multiphase flow technologies, and plays a fundamental role in the dynamics of particle-laden drops. A fundamental question is how the particles modify the effective mechanical properties of the interface. Using a fast Eulerian-Lagrangian model for interfacial colloids, we have simulated a pendant drop whose surface is covered with spherical particles having short-range repulsion. The interface curvature induces non-uniform and anisotropic interfacial stresses, which we calculate by an interfacial extension of the Irving-Kirkwood formula. The isotropic component of this stress, related to the effective surface tension, is in good agreement with that calculated by fitting the drop shape to the Young-Laplace equation. The anisotropic component, related to the interfacial shear elasticity, is highly non uniform: small at the drop apex, significant along the drop sides. The reduction in surface tension can be substantial even below maximum surface packing. We illustrate this point by simulating phase-coarsening of a two-phase mixture in which the presence of interfacial particles "freezes" the coarsening process, for surface coverage well below maximum packing

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