

Abstract Submitted
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Capillary interactions between elongated microparticles: A Pair Potential KATHLEEN STEBE, ERIC LEWANDOWSKI, LORENZO BOTTO, UPenn — Particles at fluid interfaces create distortions. When distortions from neighboring particles overlap, the area, and hence the energy, decreases if the particles migrate toward each other. Elongated particles orient as they approach, and have preferred orientations upon assembly. For elongated microparticles like ellipsoids or cylinders, the interface distortion resembles an elliptical quadrupole a few radii away from the particle surface. We present an anisotropic pair potential based on elliptical quadrupoles. This potential predicts an attractive force and a torque, which depend strongly on aspect ratio, in keeping with experiment on cylinders at interfaces. Particle trajectories and angular orientations recorded by video microscopy for cylinders agree with the predicted potential. In particular, the analysis predicts the rate of rotation, a feature lacking in prior analyses. Open issues associated with near field effects are briefly discussed.

Eric Lewandowski
UPenn

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