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# Self-assembly of ellipsoidal particles at fluid-fluid interfaces with an empirical pair potential

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## Abstract

Colloidal particles adsorbed at fluid-fluid interfaces interact via mechanisms that can be specific to the presence of interfaces, for instance, lateral capillary interactions induced by nonspherical particles. Capillary interactions are highly relevant for self-assembly and the formation of surface microstructures, however, these are very challenging to model due to the multibody nature of capillary interactions. This work pursues a direct comparison between our computational modelling approach and experimental results on surface microstructures formed by ellipsoidal particles. We begin by investigating the accuracy of using pairwise interactions to describe the multibody capillary interaction by contrasting exact two- and three-particle interaction energies and we find that the pairwise approximation appears reasonable for the experimentally relevant configurations studied. We then develop an empirical pair potential and use it in Monte-Carlo type simulations to efficiently model the structure formation process for relevant particle properties such as aspect ratio, contact angle and surface cover-

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