

Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Capillary Forces between Floating Objects: Superhydrophobic Surfaces Provide Mechanistic Insight MINCHAO ZHANG, THOMAS J. MCCARTHY, ALFRED J. CROSBY, Univ of Mass - Amherst — When two floating objects are close, they will either move towards or away from one another to minimize the energy caused by the overlap of the liquid/air interfacial deformations. Capillary forces cause these behaviors, but directly relating the interfacial deformations and the capillary interactions hasn't been explored experimentally. We choose a liquid marble, which has a superhydrophobic surface, as a free floating object and a fixed "wall" with carefully controlled contact angle as another object to generate two deformations at the interface. When the liquid marble is close to the wall, the two deformations interact, causing changes in the Laplace pressure at the interface and a reconfiguration of the interface. In response, the liquid marble moves either towards or away from the wall. Using image analysis of videos recording the liquid marble position as a function of time, we measured the liquid marble to wall distance and determine the spatio-temporal relationships. Furthermore, capillary forces were calculated from the velocities and accelerations. Based on this data, we present a new explanation for the capillary interactions from the perspective of Laplace pressure changing induced the reconfiguration of the interfacial deformations.

Minchao Zhang
Univ of Mass - Amherst

Date submitted: 05 Nov 2015

Electronic form version 1.4