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Bubble Shape and Stress Induced Rearrangements in a Bubble Raft[1] BRIAN SEYMOUR, OLIVIA CYPULL, CHRISTINE O'DEA, James Madison University, SHENGFENG CHENG, Virginia Polytechnic Institute and State University, KLEBERT FEITOSA, James Madison University — Soap bubbles floating at an air-water interface experience shape deformations as a result of surface tension and hydrostatic forces. In this experiment we experimentally investigate the shape of individual gas bubbles freely floating at the interface as a function of their gas volume. As bubbles increase in volume, their shape goes from spherical to hemispherical. We empirically determine the dependence of the capillary rise and dome radius as a function of the diameter of the bubbles. Due to shape deformations, collections of interfacial bubbles tend to aggregate and form stable jammed packings. We investigate the stress distributions in these floating aggregates by placing them between parallel plates and subjecting them to uniaxial compression while capturing the deformations and rearrangements with a video camera. We find that under compression, the stress distribution is inhomogeneous and characterized by strings of more stressed bubbles around less stressed regions reminiscent of force chains in granular materials. Finally bubble rearrangements are mapped against the stress map to inform their correlation with local stress variations in the bubble raft.

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