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Anomalous coalescence in sheared two-dimensional foam HADI MOHAMMADIGOUSHKI, GIOVANNI GHIGLIOTTI, Department of Chemical and Biological Engineering, University of British Columbia, Vancouver, BC V6T 1Z3, Canada, G.M. HOMSY, Department of Mathematics, University of British Columbia,Vancouver, BC V6T 1Z2, Canada, JAMES FENG[1], Department of Chemical and Biological Engineering, University of British Columbia, Vancouver, BC V6T 1Z3, Canada — We report an experimental study on shearing a monolayer of monodisperse bubbles floating on liquid in a narrow-gap Couette device. The bubbles in such a "bubble raft" coalesce only if the shear rate exceeds a threshold value. This is in contrast to the conventional wisdom that bubbles and drops coalesce for gentler collisions, at shear rates below a critical value. Furthermore, the threshold shear rate increases with the bubble size and the viscosity of the suspending liquid, contravening reasoning based on capillary number. Through visualization and scaling arguments, we have advanced an explanation of the anomalous behavior in terms of inertial forces on the bubbles, which compress the bubbles radially inward and accelerate film drainage. The scaling relationship correlates well with experimental data.

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