Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

Microscopic aspects of Liquid Foam Fracture SASCHA HILGENFELDT, Mechanical Science and Engineering, University of Illinois at Urbana-Champaign, PETER STEWART, OCCAM Mathematical Institute, The University of Oxford, STEPHEN DAVIS, Engineering Sciences and Applied Mathematics, Northwestern University — A layer of foam bubbles between parallel plates (a quasi-two-dimensional liquid foam) gives unique access to the details of microscopic configurations in a system whose macroscopic properties include both liquid and solid behavior. The failure of cohesion under stress in such a layer of bubbles offers a study case on fracture, which we have experimentally shown to occur both in a mode similar to fluid fingering and a mode similar to the cleavage of a solid material. Simulations elucidate the microscopic aspects and the fluid-dynamical mechanisms behind these processes, spanning a wide variety of length and time scales and incorporating both fracture modes. Aspects of microstructure and rate dependence can thus become part of a detailed study of fundamental fracture processes.

Sascha Hilgenfeldt
University of Illinois at Urbana-Champaign

Date submitted: 02 Aug 2012 Electronic form version 1.4