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Fracture Phenomena in Foams: From Film Instability to Wave Propagation SASCHA HILGENFELDT, University of Illinois at Urbana-Champaign, PETER STEWART, University of Glasgow — Injection of a gas into a gas/liquid foam is known to give rise to instability phenomena on a variety of time and length scales. Macroscopically, one observes a propagating gas-filled structure that can display properties of liquid finger propagation as well as of fracture in solids. The observation of both large-scale, finger-like cracks (without film breakage) and brittle cleavage phenomena (consisting of successive film ruptures) is explained through careful modeling of phenomena ranging from thin-film instabilities to friction between bubbles and confining plates. Whereas we use a network approach with full representation of the foam microstructure to model the cracks, we also derive a continuum limit description in order to investigate possible modes of wave propagation and their feedback on the fracture process.

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