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Microstructural effects in foam fracture PETER STEWART, Univ of Glasgow, STEPHEN DAVIS, Northwestern University, SASCHA HILGENFELDT, University of Illinois, Urbana Champaign — We examine the fracture of a quasi two-dimensional aqueous foam under an applied driving pressure, using a network modelling approach developed for metallic foams by Stewart & Davis (*J. Rheol.*, vol. 56, 2012, p. 543). In agreement with experiments, we observe two distinct mechanisms of failure analogous to those observed in a crystalline solid: a slow ductile mode when the driving pressure is applied slowly, where the void propagates as bubbles interchange neighbours through the T1 process, and a rapid brittle mode for faster application of pressures, where the void advances by successive rupture of liquid films driven by Rayleigh–Taylor instability. The simulations allow detailed insight into the mechanics of the fracturing medium and the role of its microstructure. In particular, we examine the stress distribution around the crack tip and investigate how brittle fracture localizes into a single line of breakages. We also confirm that pre-existing microstructural defects can alter the course of fracture.

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