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Rifts in Rafts KHA-I TO, DANIEL HEXNER, VINCENZO VITELLI, SIDNEY NAGEL, University of Chicago — Two-dimensional particle rafts are single-layers of aggregated sub-millimeter polydisperse particles floating at an air-fluid interface. The material failure of such rafts under an applied extensional load has a morphology that appears to be distinct from other known fracture modes. At higher extensional shear rates, numerous small-scale cracks are distributed diffusively throughout the entire system; at low strain rates, the distance between adjacent cracks increases. The characteristics of this distributed failure also depend on the surface tension and viscosity of the underlying fluid. To decrease the influence of secondary flows, we perform experiments by changing the liquid level in the tanks with inclined walls so that we are able to increase the area accessible to the rafts as the liquid height changes. This results in an expansion in quasi-1D (with and without boundaries) and isotropic 2-D expansion in the linear and cylindrical geometries respectively. We simulate this behavior with a model based on weak interparticle forces coupled to an expanding underlying metric.

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