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The path to fracture: dynamics of broken-link networks in granular flows MARK HERRERA, University of Maryland, SHANE MCCARTHY, STEVEN SLOTTERBACK, MICHELLE GIRVAN, WOLFGANG LOSERT, University of Maryland — Capturing the dynamics of granular flows on intermediate length scale can often be difficult. We propose the broken-links network as a new tool to study fracture at the intermediate scale. Using experimental data on the 3D tracks of all particles in a region, we calculate the dynamically evolving broken-links network and observe a second-order, percolation-like phase transition in the formation of the giant component as links are broken. We implement a velocity gradient model of link breakages and find that the model demonstrates a faster growth of the giant component than the data. Surprisingly, the broken-links network formed in the model is also more highly clustered than our empirical observations.

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