

Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Dynamics of failure in 2d granular packings JENNIFER RIESER, YUKA TAKEHARA, University of Pennsylvania, WENBIN LI, JU LI, Massachusetts Institute of Technology, JERRY GOLLUB, Haverford College, DOUGLAS DURIAN, University of Pennsylvania — We explore the grain-scale interactions that precede large-scale deformations and mark the onset of mechanical failure in two-dimensional granular packings. The two-dimensionality of the system allows for direct observation of all particle dynamics during the compression of a pillar. The grains are cohesive, with an attraction governed by tunable capillary forces that are induced through an interstitial fluid. We are particularly interested in the initial deformation of the pillar. Here we characterize local structure and dynamics leading up to the first large-scale event. For our analysis, we focus on how local structure within the packing relates to local dynamics and eventually to large-scale deformation. Local structure and rearrangements are characterized by information from a Delaunay triangulation, and are compared with larger-scale deformations identified by spatial variations in the velocities of the particles. We explore the effects of pillar size and cohesion strength on the dynamics in both ordered and disordered packings.

Jennifer Rieser
University of Pennsylvania

Date submitted: 09 Nov 2012

Electronic form version 1.4