Abstract Submitted
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Structural Stability and Jamming of Self-Organized Cluster Conformations in Granular Materials[1] A. TORDESILLAS, U. of Melbourne, B. BEHRINGER, Duke U, Q. LIN, J. SHI, U. of Melbourne, J. ZHANG, Indiana U-Purdue University-Fort Wayne — We probe emergent self-organized particle cluster conformations in slowly deforming dense granular materials. We invoke structural mechanics to devise a new stability measure for clusters, and use this measure to explore stability of jammed states of cluster conformations consisting of particles in force chains and minimal contact cycles. Knowledge of the spatio-temporal evolution of the (relative) stability of jammed conformations offers valuable clues to granular rheology and self-assembly. We use data from assemblies of bi-/poly-disperse disks subject to 2D deformation in two biaxial strain tests: one computational and one experimental. Self-assembly occurs on multiple length scales with jammed force chains and minimal cycles forming the basic building blocks. Three-cycles are stabilizing agents acting as granular trusses to load-bearing force chain columns. The co-evolution of minimal cycles and force chains form a generic feature of these materials and loading paths.

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