

# Transition dynamics of structural motifs in a granular contact network

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A deforming dense assembly of granular particles can be usefully represented by its evolving contact network. A study of the 3-cycle motifs of the contact network and their interplay with the force chains of structural mechanics reveals that in an effort to ward off imminent failure a granular material rearranges to form structures akin to the power towers seen in theme parks. A more detailed investigation of other network motifs, in particular their transition dynamics, uncovers the most prevalent and almost-invariant transition sets of motifs within the material. When further coupled, at the meso-scopic scale, to a measure of structural stability we begin to probe the role these granular motifs play in the self-organization properties and preferred configurations apparent in a granular material subject to loading. Results are presented for an experimental biaxial apparatus of bi-disperse photo-elastic disks subject to pure shear.