

Abstract Submitted
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Planarity of Force Tilings in Jammed Packings of Disks¹ KABIR RAMOLA, BULBUL CHAKRABORTY, Brandeis University — We propose a new order parameter for load induced jamming transitions in disk packings based on the planarity of force tilings. Contact forces between disks in mechanical equilibrium can be arranged in a dual space to form a network (tiling) represented by a set of vertices and edges $\mathcal{G} = (\mathcal{V}, \mathcal{E})$. A Delaunay triangulation of these vertices then forms a related network $\mathcal{G}_{\mathcal{D}} = (\mathcal{V}, \mathcal{E}_{\mathcal{D}})$. We define a planarity order parameter ψ as the overlap of these two graphs $\psi = \langle \mathcal{G}_{\mathcal{D}} | \mathcal{G} \rangle$. We use this parameter to characterize jamming transitions in two dimensional granular systems. We find clear signatures of the existence of non-planar and planar phases as a function of external load. We study this behaviour using simulation data of frictionless soft disks and experimental data of frictional disk packings.

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