Abstract Submitted
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Characterization of Basin Volumes in Mechanically Stable Packings[1] MARK D. SHATTUCK, Benjamin Levich Institute and Physics Department of The City College of New York, S.S. ASHWIN, Departments of Mechanical Engineering & Material Science and Physics, Yale University, JERZY BLAWZDZIEWICZ, Department of Mechanical Engineering, Texas Tech University, COREY S. O'HERN, Departments of Mechanical Engineering & Material Science and Physics, Yale University — There are a finite number of distinct mechanically stable (MS) packings in granular systems composed of frictionless particles. For typical packing-generation protocols employed in experimental and numerical studies, the probabilities with which the MS packings occur are highly nonuniform and depend strongly on preparation protocol. Despite intense work, it is extremely difficult to predict *a priori* the MS packing probabilities. We describe a novel computational method for calculating the MS packing probabilities by directly measuring the volume of the MS packing 'basin of attraction', which we define as the collection of initial points in configuration space at *zero packing fraction* that map to a given MS packing by following a particular dynamics in the density landscape. We show that there is a small core region with size l_c surrounding each MS packing in configuration space in which all initial conditions map to a given MS packing. However, we find that the MS packing probabilities are not strongly correlated with l_c and thus they are determined by complex geometric features of the landscape that are distant from the MS packing.

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