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Structure of jammed configurations and their relation to unjamming times[1] SUMIT KUMAR BIRWA, TIFR Centre for Interdisciplinary Sciences, Hyderabad, CARL MERRIGAN, BULBUL CHAKRABORTY, Brandeis University, SHUBHA TEWARI, University of Massachussetts, Amherst — The distribution of the times for the cessation of flow of grains falling under gravity in a vertical hopper is known to be exponential. Recent experiments have shown, however, that the time lapse between avalanches follows a power-law distribution when the hopper is unjammed using periodic vertical vibrations[2]. The reasons for this distribution of the unjamming times, which indicates the time needed for an applied continuous perturbation to induce another avalanche, are not well understood. We report on a numerical simulation of granular hopper flow using LAMMPS[3] in which we seek to understand the origin and scope of this behavior. We find that cessation of flow is related to the formation of a stable arch that spans the system. However, the actual structure of the jammed configuration varies and is closely related to the unjamming time. We find that the symmetry of the arches is an important parameter in determining the strength of the jammed configurations. Using different force thresholds, we have characterized the contact networks around the arches which provides stability to the packed structure and analyzed the strength of various jammed configurations.

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[2]I. Zuriguel et al., Scientific reports 4, 7324 (2014).
[3]http://lammps.sandia.gov/

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