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Friction-induced hysteresis in quasi-static granular jamming MAHESH BANDI, Los Alamos National Laboratory, ANDRAS LIBAL, Universiteit Antwerpen, MICHAEL RIVERA, ROBERT ECKE, Los Alamos National Laboratory — Static granular packings are usually interrogated via quasi-static measurements where the packing fraction serves as the control parameter to study the pack evolution. In the absence of externally induced vibrations (effective granular temperature), quasi-static measurements are justified because the system in question is athermal. Whereas this is true for frictionless granular packings, we experimentally demonstrate the failure of quasi-staticity for frictional packings in a quasi two-dimensional system of disks. This failure is traced to hysteretic responses in the system which shifts the critical packing fraction at which the system jams to progressively higher values as the system is repeatedly jammed and un-jammed. The shift in critical packing fraction marks the system's evolution from a Random Loose Packed (RLP) to a Random Close Packed (RCP) density. This rate of evolution is experimentally determined to depend upon the quasi-static step size and the static friction coefficient of the constituent disks in the system.

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