

Abstract Submitted
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A thermodynamic equation of jamming KEVIN LU, H. PIROUZ KAVEHPOUR, Department of Mechanical and Aerospace Engineering, UCLA — Materials ranging from sand to fire-retardant to toothpaste are considered fragile, able to exhibit both solid and fluid-like properties across the jamming transition. Guided by granular flow experiments, our equation of jammed states is path-dependent, definable at different athermal equilibrium states. The non-equilibrium thermodynamics based on a structural temperature incorporate physical ageing to address the non-exponential, non-Arrhenious relaxation of granular flows. In short, jamming is simply viewed as a thermodynamic transition that occurs to preserve a positive configurational entropy above absolute zero. Without any free parameters, the proposed equation-of-state governs the mechanism of shear-banding and the associated features of shear-softening and thickness-invariance.

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