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Unifying Suspensions and Inertial Granular flows near Jamming

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Observations support that the fluid to solid transition in granular materials is a continuous transition, with diverging length scales and singular flow curves. I will introduce a framework that predict quantitatively scaling exponents near this transition when particles are frictionless. This framework captures both aerial granular flows and over-damped suspensions, phenomena traditionally studied by two distinct communities.

In this description, the dense fluid phase can be thought as a gas of excitations of the solid phase. Key aspects of the solid entering the description can be obtained by dynamical argument, and imply that the solid is marginally stable. Recent calculations in infinite spatial dimension support however that thermodynamics arguments a la Edwards also capture this marginality.