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Jamming of Granular Flow in a Two-Dimensional Hopper[1] JUNYAO TANG[2], SEPEHR SADIGHPOUR[3], ROBERT BEHRINGER[4], Duke Physics
— We seek an understanding of the physics of jamming in flow from a hopper. Using spatio-temporal video data for photoelastic disks (mean diameter d) flowing through a two-dimensional hopper (opening size D.), we have found experimental support for the hypothesis that the probability of flow surviving until time t without jamming has the form $P_s(t) = \exp(-t/\tau)$. The important physics is encapsulated in τ, and how that depends on the ratio D/d. Estimates of τ vary as a power-law or an exponential in D/d for a jamming model and an arch formation model. Through particle tracking we conclude that jamming requires both a high packing fraction and a stable force chain arch at the outlet. Work in progress is yielding data for τ vs. the hopper angle as well as D/d.

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