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Effect of interstitial fluid on event-size distribution for granular hoppers. JUHA KOIVISTO, DOUGLAS DURIAN, Univ of Pennsylvania — The discharge of granular hoppers is avalanche-like in that flow proceeds until probabilistically interrupted by the formation of a stable arch over the hole. The average event size appears to diverge at a critical hole size, thus defining a putative clogging transition. However, we now believe that instead it grows exponentially as a power of the hole diameter, so in fact all hoppers are susceptible to clogging[1]. To investigate the influence of grain dynamics on arch formation, we conducted a series of experiments where the event size distribution was measured for grains in a system that was totally submerged in water. We find that the distribution is exponential, just as for dry non-cohesive grains in air. However, for a given hole the number of grains in the average event decreases roughly with a factor of two, and the critical hole size increases by 10%. Thus, submerged hoppers are more susceptible to clogging and dynamics play a role. In air, the "effective temperature" set by rms grain speed helps to prevent arch formation.

[1]C.C. Thomas et al., Phys. Rev. Lett. 114, 178001 (2015).

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