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Mechanics of sequential jamming and unjamming phenomena in a multi-exit orifice silo[1] AMIT KUNTE, ASHISH ORPE, PANKAJ DOSHI, Chemical Engineering Division, National Chemical Laboratory, Pune India 411008
— We have investigated the flow of a two dimensional granular assembly draining through a flat bottomed silo having multiple exit orifices using DEM simulations. The width of the central orifice of the silo is fixed at $3.5d$ which is small enough to cause jamming (or no-flow) through the orifice. Here d is the mean particle diameter. The width of the other nearby orifices is kept much more than $3.5d$, thus, ensuring continuous flow of particles through them. Interestingly, this continuous flow of particles in the vicinity interacts with the assembly of jammed particles above the central orifice causing rearrangements and ultimately unjamming the assembly leading to a smooth flow. During the entire drainage of the silo, the central orifice undergoes this sequence of jamming-unjamming event several times, the frequency of which depends on its proximity to the nearby orifices. We focus primarily on understanding this jamming-unjamming transition by investigating the contact force network and the normal force distributions. Our preliminary results show that the tails of the force distributions in the jammed region decay slower than those for the flowing regions. This qualitative behaviour is found to be independent of any prior rearrangement history.

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