Linking bottleneck clogging with flow kinematics in granular materials: The role of silo width

AHMED MOHAMED ALI ASHOUR AHMED ,D. Gella, D. Maza, I. Zuriguel, R. Ar®valo and R. Stannarius

Abstract

We demonstrate experimentally that clogging in a silo correlates with some features of the particle velocities in the outlet proximities. This finding, that links the formation
of clogs with a kinematic property of the system, is obtained by looking at the effect that the position of the lateral walls of the silo has on the flow and clogging behavior.
Surprisingly, the avalanche size depends nonmonotonically on the distance of the outlet
from the lateral walls. Apart from evidencing the relevance of a parameter that has been
traditionally overlooked in bottleneck flow, this nonmonotonicity supposes a benchmark
with which to explore the correlation of clogging probability with different variables within
the system. Among these, we find that the velocity of the particles above the outlet and
their fluctuations seem to be behind the nonmonotonicity in the avalanche size versus wall
distance curve.

PHYSICAL REVIEW FLUIDS 2017, August

Future University In Egypt (http://www.fue.edu.eg)

Copyright É 2024 [Future University in Egypt]. All rights reserved.