MAR17-2016-020501

Abstract for an Invited Paper
for the MAR17 Meeting of
the American Physical Society

Clogging arches in grains, colloids, and pedestrians flowing through constrictions[1]

IKER ZURIGUEL, University of Navarra

When a group of particles pass through a narrow orifice, the flow might become intermittent due to the development of clogs that obstruct the constriction. This effect has been observed in many different fields such as mining transport, microbial growing [**?**], crowd dynamics, colloids, granular and active matter [**?**]. In this work we introduce a general framework in which research in some of such scenarios can be encompassed. In particular, we analyze the statistical properties of the bottleneck flow in different experiments and simulations: granular media within vibrated silos, colloids, a flock of sheep and pedestrian evacuations. We reveal a common phenomenology that allows us to rigorously define a transition to a clogged state. Using this definition we explore the main variables involved, which are then grouped into three generic parameters. In addition, we will present results of the geometrical characteristics that the clogging arches have which are related with their stability against perturbations [**?**]. We experimentally analyse the temporal evolution of the arches evidencing important differences among the structures that are easily destroyed and those that seem to resist forever (longer than the temporal window employed in our measurements).

References

[1] M. Delarue et al., Nature Physics **12**, 762 (2016).

[2] I. Zuriguel et al., Scientific Reports **4**, 7324 (2014).

[3] C. Lozano et al, Phys. Rev. Lett. **109**, 068001 (2012).

[1]Ministerio de Economa y Competitividad (Spanish Government). Project No. FIS2014-57325