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From Darcy flow to fingering instabilities in a fluid-driven silo

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The flow of granular matter in silos has been extensively studied, largely due to its prevalence in industry. However questions remain, for instance regarding the nature of the velocity field, while work considering submerged, fluid-driven systems is somewhat scarce. In this work, fluid-driven granular drainage was performed in a quasi-two-dimensional silo with grains submerged in fluid. A variety of behaviours were observed, including Darcy flow through the static packing of the silo at low flow rates, Gaussian grain velocity profiles at moderate flow rates and finger-like instabilities at the upper grain boundary that penetrate the packing at high flow rates in addition to the occurrence other transient phenomena. The transitions between these regimes are discussed and explored with the aid of phenomenological models.

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References

Time Block Preference

Time Block B (14:00-17:00 CET)

Participation

Online

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