

Spontaneous oscillations and catastrophic events during fluid injection in water-saturated sands

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Although multiphase flows are ubiquitous in natural and industrial systems, the comprehension of the physical mechanisms at stake is still a challenge. In particular, the link between the processes at the microscale – grain size, shape, asperities – and the behavior at larger scale (particle suspension, transport, emergence of instabilities) remains unknown. Based on laboratory experiments, we investigate the dynamics of a confined granular layer submitted to a localized fluid injection. A suspension results from the competition between particle entrainment and sedimentation. In a given range of parameters and for different experimental configurations, the system exhibits puzzling self-induced oscillations and unexpected, violent particle resuspension. The importance of such phenomena will be discussed in regards to geophysical and environmental applications.

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