Local Failures and Avalanches in cohesive granular materials

In the presence of inter-particle cohesion, gradually inclining a bed of particles can lead to localized mobilization of grains on the downstream edge. Experiments of such failure are observed to display successive loop-like structures on the top surface from where material is locally mobilized, leading to the formation of cliffs. A gradient of cohesion in depth seems to be necessary to observe this phenomenon, modeled in experiments using a curved bed, and controlled cohesion. Such features are characteristic of cohesive failures at free edges, for instance, as observed in nature as collapsing cliffs. Scale bars shown are 2 cm.







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