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Granular fingering instability: A first attempt to access the most unstable mode CHICO ROCHA, University of Manchester , NICO GRAY , CHRIS JOHNSON , Univeristy of Manchester — Mixtures of grains of different sizes tend to segregate as they avalanche downslope, with large particles rising to the near surface regions which move faster. As a result, large particles tend to be preferentially transported to flow front where they can accumulate by being over-run and resegregated to the surface. If the large particles are also more frictional, the flow becomes unstable and breaks-up in a series of fingers: the so-called granular fingering instability. This instability is observed in a wide variety of systems, from geophysical mass flows, such as pyroclastic flows, to small-scale experiments relevant to industry. Key features of the fingering pattern are predicted by a particle-size segregation model, coupled with a depth-averaged avalanche model, in which a viscous term play a vitally important role in making the equations well-posed. We carry out a detailed numerical stability analysis to investigate what sets the wavelength of the fingers.

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