Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

On the granular fingering instability: controlled triggering in laboratory experiments and numerical simulations[1] NATHALIE VRIEND, JONNY TSANG, MATTHEW ARRAN, BINBIN JIN, ALEXANDER JOHNSEN, Univ of Cambridge — When a mixture of small, smooth particles and larger, coarse particles is released on a rough inclined plane, the initial uniform front may break up in distinct fingers which elongate over time. This fingering instability is sensitive to the unique arrangement of individual particles and is driven by granular segregation (Pouliquen et al., 1997). Variability in initial conditions create significant limitations for consistent experimental and numerical validation of newly developed theoretical models (Baker et al., 2016) for finger formation. We present an experimental study using a novel tool that sets the initial fingering width of the instability. By changing this trigger width between experiments, we explore the response of the avalanche breakup to perturbations of different widths. Discrete particle simulations (using MercuryDPM, Thornton et al., 2012) are conducted under a similar setting, reproducing the variable finger width, allowing validation between experiments and numerical simulations. A good agreement between simulations and experiments is obtained, and ongoing theoretical work is briefly introduced.

[1]NMV acknowledges the Royal Society Dorothy Hodgkin Research Fellowship

Nathalie Vriend
Univ of Cambridge

Date submitted: 01 Aug 2017 Electronic form version 1.4