The role of Particle Shape in Granular Dam Break Dynamics

Background:

The collapse of a granular medium is a common and often catastrophic phenomenon in industrial and geophysical situations such as dam breaks, avalanches, landslides, and debris or pyroclastic flows. Yet, despite their importance, our understanding of their dynamics remains incomplete. This is largely due to the lack of experiments conducted to observe the slump of a suddenly released granular pile on a horizontal surface.

In this project, we will extend our experimental work in a laboratory-scale dam-break setup. We will address interesting questions such as:

- What is the effect of particle shapes on the flow dynamics, such as the final run-out and the velocity of collapse front?
- How will the dynamics evolve if the initial mass in the column is conserved?
- What is the effect of the second aspect ratio H/W (column height/column width) on the flow dynamics?

Methods:

A simple rectangular setup will be used to perform the experiments. The setup is flexible in such a way that we can change the initial width (W_o), height (H_o) and length (W_o) of the granular column. One digital camera will be used to capture images from the sidewall and another camera will be used from the top of the setup to estimate the true run-out of the collapse. Two types of rice, lentil, and macaroni-shaped particles will be used to perform experiments.

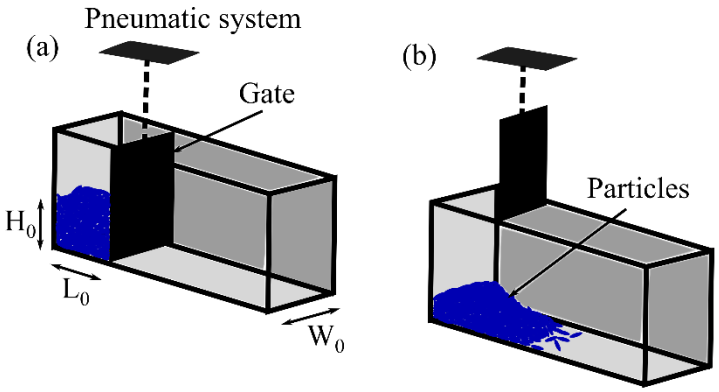

Figure1. Schematic of the granular pile in setup: (a) before lifting gate (b) after lifting gate in the experiment.

Contact:

- *Muhammad Ahmed Hanif (Physics of Fluids), email address: m.a.hanif@utwente.nl
- Devaraj van der Meer (Physics of Fluids), email address: d.vandermeer@utwente.nl