



Cohesion in Granular Flow

The objective was to compare the flows of sand and ceramic microspheres (CMS) through identical holes, side-by-side. The grain sizes differ by approximately an order of magnitude. The acrylic cylinder has equal sized upper and lower chambers, separated by a perforated disk. Each chamber is divided into two equal bins by a vertical sheet, separating the granular materials. The perforated disk has symmetrical holes about the vertical dividing plane. About 90% of the lower chamber is filled with respective granular materials and the rest is air.

When the cylinder is turned upside down, sand and CMS flow down through identical geometries but very differently. Sand flows quickly and uniformly, while CMS' flow is erratic and intermittent with a series of landslide- and eruption-like flows. The main reason for such different behavior is cohesion among much smaller grains of CMS. This demonstration shows the importance of grain size in handling of granular materials, and is an improved version of a similar, but single granular demo, device presented at the 2017 GFM in Denver.