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Submerged granular flow of hydrophobic and hydrophilic sand BEN FOLTZ, BRIAN UTTER, James Madison University — We experimentally investigate submerged granular flows of hydrophobic and hydrophilic grains in a rotating drum. While slurry and suspension flows are common in nature and industry, effects of surface chemistry on flow behavior have received little attention. The experiment consists of a cylindrical drum containing various concentrations of hydrophobic and hydrophilic grains of sand submerged in water and rotated at a constant angular velocity. Images of the resulting avalanches are taken and analyzed. While it is known that at slow speeds, submerged avalanches appear qualitatively similar to dry flows, our results suggest that the surface properties of the grains affect underwater flow significantly. High concentrations of hydrophobic grains result in the formation of aggregates. At concentrations larger than 75% hydrophobic sand, the avalanches do not behave in a manner which is typical for sand, but as the concentration decreases, the aggregates are smaller, the angle of repose decreases, and the grains start showing properties similar to those in regular sand. We present data on the size of the aggregates, slope, and avalanche statistics with changes in concentration.

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