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Erosion and flow of hydrophobic granular materials BRIAN UTTER, THOMAS BENNS, BENJAMIN FOLTZ, JOSEPH MAHLER, James Madison University — We experimentally investigate submerged granular flows of hydrophobic and hydrophilic grains both in a rotating drum geometry and under erosion by a surface water flow. While slurry and suspension flows are common in nature and industry, effects of surface chemistry on flow behavior have received relatively little attention. In the rotating drum, we use varying concentrations of hydrophobic and hydrophilic grains of sand submerged in water rotated at a constant angular velocity. Sequential images of the resulting avalanches are taken and analyzed. High concentrations of hydrophobic grains result in an effectively cohesive interaction between the grains forming aggregates, with aggregate size and repose angle increasing with hydrophobic concentration. However, the formation and nature of the aggregates depends significantly on the presence of air in the system. We present results from a related experiment on erosion by a surface water flow designed to characterize the effects of heterogeneous granular surfaces on channelization and erosion.

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