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A comparison of the granular flow of glass spheres and sands STEVEN W. MEIER, KATHERINE P. BARTEAU, DENIZ ERTAS, HUBERT E. KING, ExxonMobil Research and Engineering — We investigate the effect of particle shape irregularity on granular flow on an erodible bed 2 cm wide confined by sidewalls 50 cm long and 20 cm tall. Three types of particles were studied: 0.65 mm spherical glass particles, rounded sand particles with a mean size of 0.87 mm, and angular sand particles with a mean size of 0.83 mm. The dynamics of the flows were measured with a high speed camera. For all particle types, the angle between the flowing free surface and horizontal increases linearly with mass flow rate. While the surface angle is greater for flows of sand particles than spherical glass particles at all mass flow rates, the change in surface angle with respect to mass flow rate is smaller for flows of sand than spherical glass particles. For all particle types, the velocity profile increases exponentially into the flowing layer from the erodible bed. For fast flows, the velocity profile is linear in the upper portion of the flowing layer. However, spherical glass particles flow in thicker flowing layers with lower surface velocities than sand particles for comparable mass flow rates.

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