Abstract Submitted
for the DFD20 Meeting of
The American Physical Society

Normal and Tangential Coefficients of Restitution of a single particle at a boundary. JEFFREY OLAFSEN, MARTIN MARTINEZ, Department of Physics Baylor University — The interesting dynamics in driven granular systems can be attributed, in part, to the complicated question of the mechanism of dissipation between two particles in collision with each other, or a particle in collision with a boundary. The exact description of the coefficient of restitution (COR) even in a low dimensional system, has been investigated over decades. It remains an important detail in understanding the dynamics of both flow and jamming in collections of larger numbers of macroscopic particles studied in a variety of geometries and for different methods of energy injection. Here, we present the results from two experimental investigations for a horizontally driven, vertical boundary of wedge, parabolic and hyperbolic shapes. A single particle free to move within the cell collides with the boundary twice per shaking cycle. High speed photography allows for the velocity of the particle both before and after the collision to be extracted from the experiment and analyzed. A value for the COR can be determined in two ways: from either the velocity or the total energy before and after the collision at the boundary. The results demonstrate regimes of both surprisingly simple and more complex behavior dependent upon the shape of the boundary.

Jeffrey Olafsen
Baylor University

Date submitted: 31 Jul 2020 Electronic form version 1.4