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Investigating Low Dimensional Chaos with Nearly Elastic Spheres ALEX SABEY, COREY LAFONTAINE, JEFFREY OLAFSEN, Department of Physics, Baylor University — An experimental and numerical study of the dynamics in a system which is prone to chaotic motion is implemented via a shaking plate and two nearly elastic particles. Confined to move in the vertical direction, one spherical particle is driven by the shaking plate while the other sphere is driven by collisions with the first. The motion of the two particles and the plate were captured with a relatively high speed ($\sim$340 fps) CCD camera via image analysis algorithms written in IDL. Measurements of position, velocity, acceleration, and energy and are used to formulate a thorough description of the system. The experimental results are compared to those of a numerical simulation to explore phase space for chaotic orbits of the two trajectories as well as phase synchronization between the particles and the plate. A thorough investigation of the phase space to describe the low dimensional system as well as to examine the dynamics for phase synchronization between the two particles will be presented.

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