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Breathing Phenomena in Driven, Confined, Granular Chains¹ ROBERT SIMION, Physics Dept, SUNY-Buffalo, ADAM SOKOLOW, Physics Dept, Duke University, SURAJIT SEN, Physics Dept, SUNY-Buffalo — We consider a tapered granular alignment where the spherical grains progressively shrink in radius by a factor q. The system has a hard wall at one end and a piston at the other. We assume that the piston can be used to impart a force F (time- dependent or otherwise) to an edge grain in the system. Extensive particle dynamics simulations and theoretical analysis reveal that such a system could revert back and forth between an oversqueezed state and a dilated state - i.e., "breathe." The breathing is strongly dependent on the driving. When driven with a constant force, we show that $TF^{1/6}$ is a constant for fixed q. More complex dynamics including nonlinear-resonance is observed when F = F(t). The talk shall discuss the observed dynamical responses of the system.

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Surajit Sen SUNY-Buffalo

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