Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Nonlinear Vibrational Response in Frictional Sphere Packings THIBAULT BERTRAND, COREY S. O'HERN, Yale University, MARK D. SHATTUCK, Benjamin Levich Institute, City College of the City University of New York — The response of frictional granular packings to vibrations can display complex spatiotemporal dynamics due to strong nonlinearities from contact breaking, Hertzian contact interactions, frictional sliding, and other sources that are inherent in granular media. However, most computational and theoretical studies of the vibrational response of packings of frictional spheres have only characterized the linear vibrational response using the dynamical matrix. Here, we directly measure the frequency content of the response of packings of frictional spheres to vibrations as a function of the amplitude and frequency of the perturbations. By doing this, we are able to capture the transition from linear to nonlinear response as a function of the driving and identify the largest source of the nonlinear response for systems with different friction coefficients and packing fraction.

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Date submitted: 15 Nov 2013 Electronic form version 1.4