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Self-organization in periodically sheared granular materials SAM WILKEN, GARY L HUNTER, PAUL M CHAIKIN, New York University — Self-organization as a result of periodic shear is becoming a feature observed in an increasing number of systems. In our experiments, we enforce cyclic shear on a three dimensional system of non-Brownian particles to investigate the global packing behavior of the granular assembly. By starting with a dilated, loosely packed system and measuring the packing fraction after each shear cycle, we find the system compacts to reach a steady state with a well defined packing fraction. The shear amplitude determines the steady state packing fraction, where large amplitude shear produces a lower packing density and small amplitude shear produces a higher packing density. We also study the phase diagram of this system which exhibits caged motion and a transition to vorticity.

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