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Shock Instability and Pattern Emergence in Oscillated Granular Media[1] JUSTIN STUCK, SARAH ANDERSON, BARBARA SKRZYPEK, JON BOUGIE, Loyola University Chicago Department of Physics — We study shocks formed in vertically oscillated layers of granular media and how shock instability relates to resultant pattern formation. Layers of granular media oscillated vertically on a plate at accelerational amplitudes greater than gravity are tossed off the plate, and shocks are formed upon the layers return to the plate. Previous studies have shown that the emergence of standing-wave patterns is dependent on the plates accelerational amplitude and oscillation frequency. We numerically solve continuum equations to Navier-Stokes order using forward-time, centered space (FTCS) differencing on a three-dimensional spatial grid. We employ variable timesteps and parallelization for efficiency. These simulations demonstrate shock instability before and after the onset of patterns. We use data from these simulations to investigate the connection between shock instability and pattern emergence.

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