

Undulations and Ripples of a Thin Granular Layer Due to Vertical Vibration

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An experimental study is performed on quasi-two dimensional waves in a thin granular layer of thickness h induced by vertical vibration with frequency f and amplitude a under atmospheric pressure. We used sesame of oval shape as well as different sizes of spherical glass, lead, and steel particles. Irrespective of the container size L , “ripples” are observed in a thin layer which consists of spherical particles for relatively small acceleration of external forcing. On the other hand “undulations” are observed in a thicker layer, which consists of sesame as well as spherical beads, for larger accelerations. In the latter, several eigen modes are observed, which is reminiscent of bending waves in an elastic rod. Continuum model is shown to explain the observed modes.

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