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Dynamics of density-inverted/Leidenfrost state in a vibrofluidized bed ISTAFAUL ANSARI, MEHEBOOB ALAM, Jawaharlal Nehru Ctr Adv Sci — Akin to the original Leidenfrost state, a dense, compact layer of particles can be supported by a dilute gaseous region of fast moving particles underneath it in vertically shaken granular materials– this is dubbed granular Leidenfrost state (gLS). Previous experiments and simulations have noted that the gLS is a stationary state that bifurcates from a time-periodic bouncing bed state with increasing shaking intensity. Here we report a novel unsteady behavior of the gLS in experiments on vertically shaken vibrofluidized bed of a monolayer of spherical balls. With the help of high speed imaging, we track the height of the interface (that separates the dense cloud of particles from the dilute gaseous region) as well as the top surface of the bed at various time instants of the oscillation cycle. Both these quantities are found to vary sinusoidally with time but with different amplitudes and a phase-lag and their oscillation frequencies closely match the frequency of the shaker. The amplitude difference and the phase-lag between the top-surface and interface motions are two distinguishing features of the "oscillatory" gLS. The transition from synchronized oscillatory motion to a probable "steady" gLS with increasing shaking intensity seems to be subtle.

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