

Abstract Submitted
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Density Measurements In a Vibro-Fluidized Deep Granular Bed

JAMES GILCHRIST, KENNETH FORD, HUGO CARAM, Department of Chemical Engineering, Lehigh University — The local state of a granular bed is explored through capacitance measurements of granular density fluctuations. This talk will attempt to characterize the “melting” of granular beds through vibrofluidization. The granular bed is subjected to vibration in the frequency range of 10 Hz to 200 Hz with acceleration in the range 0 to 2.0g. The bed aspect ratio (effective bed height to bed diameter) is varied up to 3.6 with effective bed height range from 0 cm to 20 cm and bed diameter of 5.6 cm. We identify the transitions between three granular bed states, the static granular state, the quasi-static state and vibro-fluidized state. Lack of density fluctuations characterize the static granular state. Large density fluctuations during the vibration cycle are characteristic of the vibro-fluidized state. The entire height of the bed can reside in a static or vibro-fluidized state at low and high vibration levels, respectively. A quasi-static bed state occurs at intermediate vibration levels, characterized by vibro-fluidized state density fluctuations in the upper portion of the bed and static state lack of density fluctuations in the lower portion of the bed. The extent of density fluctuation penetration is a function of distance from the top of the bed, rather than total bed height. Density fluctuations during the vibration cycle scale with frequency at lower frequencies and are not present at higher frequency vibrations.

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