A 2D DEM-LBM numerical simulation of localized fluidization in an immersed granular media

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In this work, a two-dimensional simulation has been developed using coupled Discrete Element and Lattice Boltzmann Methods (DEM-LBM) to simulate the fluid- particlesinteraction in a granular medium in order to investigate the frontier between motionless and fluidizedparticles, subjected to fluid flow. Specific aspects of the coupled system are developed taking into account the interaction of the two phases.
The LBM simulates fluid flows within pores spaces while the solid grains are modeled using the DEM. This paper reports numerical results of fluidized zone development in an immersed granular media under the effect of a locally injected upward fluid flow: transient and stationary regimes, thresholds, influence of injection diameter of fluid flow, hysteresis effect of the fluidized cavity regime, and interaction between two separate injections. These numerical results are compared with previous experimental data by P. Philippe and M. Badiane [Physical Review E 87, 042208, 2013].