

Two phase granular transport in cylindrical confinement

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In this study we have experimentally studied the displacement structure that emerge by the slow injection of an air phase into a granular mixture, confined by an horizontally oriented capillary tube. The tube diameter is 1.8 mm and is filled with a granular mixture, consisting of glass beads with an average size of 0.23 mm immersed in a 50/50 solution of water/glycerol. As the density of the grains is greater than that of the solution, the beads sediment to the bottom, forming a sedimented layer.

The moving air-liquid interface is observed to structure the sedimented layer into a pattern, characterized by its series of granular plugs and gaps. The preceding dynamics of the interface is identified to either be in a state of accumulation/compaction, of the region in front of the interface, or to be invading the very same region. These observations were made by capturing images and measuring the pressure in the air phase.

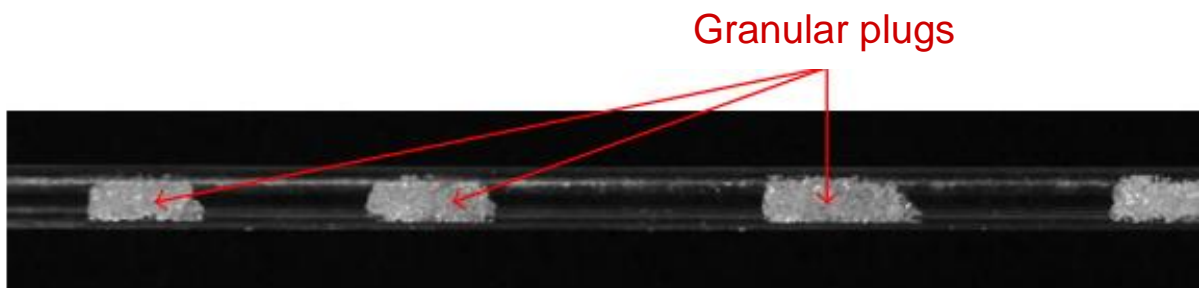


Fig.1: A side-view of the displacement pattern, where granular plugs are followed by gaps