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Effect of a punctual water jet underneath an unbounded porous media: an experimental and theoretical study FARZAM ZOUESHTIAGH, ALAIN MERLEN, Laboratoire de Mécanique de Lille (CNRS 8107), Bd P. Langevin, 59655 Villeneuve d'Ascq, France — The response of a granular bed to the presence of a punctual water jet is studied experimentally and theoretically. The setup consists of a cylindrical tank of 24 cm diameter and 17 cm height which is partially filled with sand granules. The bottom of the tank features a central nozzle from where the water flows vertically into the tank. The setup is also designed in such a way that the size of the nozzle (jet) can be varied. The experiments show that three distinct regimes associated with the flow rate, Q, appear to outline the bed's behavior. For sufficiently small Q the bed remains motionless and acts as a porous media. It then becomes deformed if Q is sufficiently large. Finally it "explodes" and a locally fluidized bed limited to an area above the jet is observed if Q is increased further. The fluidized area (chimney) appears to have a roughly cylindrical shape. The results show that the onset for fluidization as well as the size of the chimney are almost independent of the size of the jet. On the basis of above observations, a theoretical model for the flow motion with and without fluidization is advanced.

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