Abstract Submitted
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Fluidization in a centrifugal field generated by the tangential injection of the fluidization gas in a static fluidization chamber JURAY DE WILDE, Université Catholique de Louvain, GUY B. MARIN, Ghent University, AXEL DE BROQUEVILLE, Inventor — The new concept of fluidization in a centrifugal field generated by the tangential injection of the fluidization gas in a static fluidization chamber is experimentally investigated. The tangential injection of the fluidization gas via multiple gas inlet slots in the outer cylindrical wall of the fluidization chamber fluidizes the solids tangentially and induces a rotating motion of the particle bed, the solids experiencing a radially outwards centrifugal force. A radially inwards gas-solid drag force is introduced by positioning a chimney centrally inside the fluidization chamber. As such, the gas is forced to move radially inwards, fluidizing the solids radially. Both the centrifugal force and the radial gas-solid drag force being influenced by the fluidization gas flow rate, the latter is observed to have only a limited effect on the radial bed expansion which is mainly determined by the fluidization chamber design and the type of particles being fluidized. This offers important flexibility with respect to cooling or heating. The centrifugal force can be a multiple of gravity, allowing dense operation at very high gas velocities and, as a result, radial gas-solid slip velocities at least one order of magnitude larger than in conventional fluidized beds. The latter drastically improves the gas-particle heat and mass transfer.

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