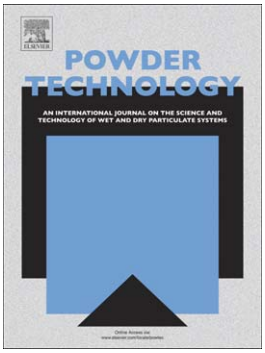

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Force on a large sphere immersed in an expanded water-fluidized bed over a wide range of voidage values

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Abstract

The presence of large objects immersed in a fluidized bed has been long studied in order to verify to what extent can the analogy with a buoyant body in a liquid represent the object-to-suspension interaction. One of the most useful information resulting from such study is the effective drag force exerted on the object and how it is related to the suspension properties, particularly with respect to the expansion degree. Implications are found also in the formulation of drag force expressions for homogeneous polydisperse systems. Much of the literature has focused on expansion degree not exceeding 0.8. In the present work, experimental results concerning equilibrium conditions and direct force measurement for a sphere immersed in a water-fluidized bed inside a 10 cm diameter, 1.75 m height fluidization column are discussed. Glass beads in three sizes (average diameter 91, 325 and 613 μm) are used as water-fluidized solid. A 2.1 cm diameter sphere held by a balance was immersed and kept fixed at the center of the cross-section but free to move axially. Measurements of the hydrodynamic force were carried out at voidage values as high as 0.94, allowing the full

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