多相流

负压差立管内的气固两相流

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摘要　　在φ800 mm×12000 mm流化床实验装置上对150 mm×11500 mm负压差立管内气固两相流的轴向压力、空隙率和气体流动特性进行了测量和分析. 立管出口无约束淹没在密相流化床内，颗粒质量流率范围G_S<1200 kg•m^{-2}•s^{-1}. 立管内气固两相流态有两种存在形式，当颗粒质量流率G_S<200～250 kg•m^{-2}•s^{-1}时，流态是稀密两相共存形式；当G_S>200～250 kg•m^{-2}•s^{-1}时，流态是浓相输送流态. 两种流态之间可以相互转换，主要取决于颗粒质量流率的变化. 影响立管内气固两相流的轴向压力、空隙率分布、气相的流动特性和气固流态存在形式的主要参数是颗粒质量流率G_S、旋风分离器入口速度V_i、下端流化床流化速度u_f，质量流率G_S是主要的影响因素.

关键词　　循环流化床　立管　气固两相流　轴向压力　空隙率　气相流动

分类号

GAS-SOLIDS TWO-PHASE FLOW IN STANDPIPE UNDER NEGATIVE PRESSURE GRADIENT

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Abstract

This paper presents an experimental study on the axial pressure, voidage and gas flow of gas-solids two-phase flow in a φ150 mm×11500 mm standpipe under negative pressure gradient.The outlet of standpipe is submerged in a dense fluidized bed and the maximum mass flux of solids is about 1200 kg•m^{-2}•s^{-1}.The axial pressures, voidage and gas flow in the standpipe are affected by mass flux of solids, inlet velocity of cyclone, fluidizing velocity, mainly determined by mass flux of solids.When mass flux of solids is less than 200～250 kg•m^{-2}•s^{-1}, there are two fluidization regimes coexisting in the standpipe,a dilute-phase flow and a bottom dense-phase flow. The pressure is low and changes little in the dilute regime.Gas flows upward, which is fluidizing gas from the standpipe bottom.When mass flux of solids is more than 200～250 kg•m^{-2}•s^{-1}, there is only one dense phase conveying regime in the standpipe.The pressure increases progressively from top to bottom and pressure profiles are smooth. Gas flows downward, and is carried by particles. The axial voidage distribution in the standpipe changes from Z-shaped profile to S-shaped as mass flux of solids increases.

Key words　　fluidized bed　standpipe　gas-solid flow　axial pressure　voidage　gas flow

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