

多相流和计算流体力学

## 工业级管道中粉煤浓相流动特性

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摘要

分别以干燥空气和粉煤为输送载气和介质, 在39 mm工业级水平不锈钢管内进行了浓相气固两相流动特性实验研究。高速摄像机拍摄到的粉煤流型表明, 浓相输送条件下存在分层流。在流化气和调节气协同作用下, 工业级管道中的粉煤浓相输送规律与此两路气流流量密切相关, 并获得了39 mm管径下的粉煤气力输送相图。与管径较小的20 mm水平不锈钢管输送结果的比较表明: 较大管径条件下, 输送压力对粉煤流率的影响更为显著, 输送的经济气速相对较高; 相同输送通量情况下, 较大管径的输送单位管长压降低, 且输送通量变化引起的单位管长压降变化也较为平缓。

关键词

[粉煤](#) [浓相](#) [工业级管径](#) [气力输送](#)

分类号

## Dense phase flow properties of pulverized coal in industrial scale tube

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### Abstract

Taking pulverized coal and dry air as the experimental materials, the flow properties of high-concentration gas-solids two-phase flow in an industrial scale horizontal stainless steel tube (I.D.39 mm) were studied. The main flow pattern was identified as stratified flow observed through a quartz glass tube. The test results indicated that the conveying characteristics were dependent on the relationship of the fluidizing gas and adjustment gas. Based on the comparison of test results of two conveying tubes (39 mm and 20 mm in diameter), some empirical expressions relating the larger tube's operating parameters, including system pressure, gas volume flow rate and solid mass flow rate, were presented. Comparisons of the two conveying tube's phase-diagrams showed: the mass flow rate of pulverized coal in the larger tube was affected by the system pressure more strongly than that in the smaller one; the larger tube had a higher superficial gas velocity at the pressure drop minimum point and a lower pressure drop if the solids mass flux rate was constant; and the change of pressure drop was less remarkably triggered by the change of solids mass flux rate.

### Key words

[pulverized coal](#) [dense phase](#) [industrial scale pipe diameter](#) [pneumatic conveying](#)

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