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论文

分区流化床内床料的横向迁移和传热特性

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摘要：

在自建的水平循环分区流化床冷态实验台上，采用示踪剂法和传热探针法，分别研究了分区流化床内床料的迁移特性和探针的传热特性；分析了流化风速、颗粒粒径、隔板高度、引射风量、探针位置和取向等因素对传热、传质特性的影响。研究表明：随着流化风速、初始床高和引射风量的增加，颗粒迁移量增加；在相同流化风速条件下，低床区的抛撒量明显高于高床区。当流化风速超过最小流化风速，传热系数随流化风速的提高迅速增加，且达到最大值，然后稍有下降；传热探针背风面的传热系数总体上比迎风面的大；传热系数随床高的增加呈现下降的趋势。总体上，颗粒横向迁移对传热效果的提高有利，在颗粒稳定迁移条件下传热系数的提高值约为30%。

关键词： 分区流化床 横向迁移 传热 传热系数

Horizontal Migration of Bed Materials and Heat Transfer Characteristics in a Divisional Fluidized Bed

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Abstract:

An innovative horizontal circulating divisional fluidized bed (HCDFB) with three fluidized zones, one plug zone, and a special solid material recirculating device located in the plug zone was developed to generate bed material horizontal circulating in the dense zone. The characteristics of bed materials migration and heat transfer in the HCDFB were carried out with helps of tracer technique and fast response heat transfer probes, respectively. The effects of fluidization velocity, particle size, initial bed height, baffle's height, injection flow rate of solid material recirculating device, and probe orientation on characteristics of particle transfer and heat transfer were analyzed. Results indicate that the amount of particle transfer increases with increasing of fluidization velocity, initial bed height, and injection flowrate; the amount of particle transfer of the low baffle zone is higher than that of the high baffle zone at the same fluidized air velocity. Heat transfer coefficients increase with the increase of fluidization velocity, and reach their maximum values at the certain fluidization number of 1.5~2.2. Heat transfer coefficients in the backward orientation were higher than those in the upward orientation. Heat transfer coefficients decrease with increasing of bed height. Generally, it will be helpful to increase around 30% of heat transfer coefficient in a HCDFB than that for an ordinary fluidized bed at the condition of stable fluidization.

Keywords: divisional fluidized bed horizontal migration heat transfer heat transfer coefficient

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