化工学报 2007 58 (11): 2753-2758 ISSN: 0438-1157 CN: 11-1946/TQ

多相流和计算流体力学

串行流化床内气固流动控制

吴家桦, 沈来宏, 肖军, 卢海勇

东南大学洁净煤发电及燃烧技术教育部重点实验室

收稿日期 2007-1-24 修回日期 2007-4-23 网络版发布日期 2007-11-7 接受日期

摘要

针对化学链燃烧分离CO_2技术特点，在一串行流化床（循环床+喷动床）冷态实验装置上，以$CaSO_4$载氧体为实验原料（d_p= 0.6 mm），研究串行流化床气固流动特性。基于床内压力分布特征，提出将循环床（空气反应器）沿床高方向划分为鼓泡段和快速流化段2个流型区域，将喷动床（燃料反应器）沿床高方向划分为喷动段、鼓泡段和悬浮段3个流型区域，得出串行流化床内气固流动控制机理。研究并考察了循环床流化风速度、喷动床喷动风速度对串行流化床内反应器间（空气反应器和燃料反应器）气体串混、颗粒循环速率以及床层压降的影响。研究结果表明，流化风是床内颗粒循环的驱动力，流化风速度应控制在 3.77～4.05 m·s^{-1} ；喷动风速度对床内颗粒循环以及系统稳定运行起着关键作用，建议将喷动风速度控制在0.42～0.56 m·s^{-1} 。

关键词

串行流化床 流化速度 气体串混 颗粒循环速率

分类号

Hydrodynamics of interconnected fluidized beds for chemical-looping combustion

WU Jiahua,SHEN Laihong,XIAO Jun,LU Haiyong

Abstract

The hydrodynamics of an interconnected fluidized bed (circulating bed and spouted bed) with $CaSO_4$ oxygen carriers (d_p= 0.6 mm) was investigated experimentally.Based on vertical pressure distribution, two zones of different flow regimes (bubbling zone and fast fluidization zone) in the circulating bed (air reactor) and three zones of different flow regimes (spouting zone, bubbling zone, and freeboard) in the spouted bed (fuel reactor) were found to exist.The effects of fluidizing and spouting gas velocities on gas leakage, solids circulating rate and pressure drop were studied.On the basis of experiments, reasonable operation parameters were recommended, which can be used as a reference for further study.

Key words

interconnected fluidized bed fluidizing velocity gas leakage solids circulating rate

DOI:

通讯作者 沈来宏 Lhshen@seu.edu.cn