

多相流和计算流体力学

不同入口结构下行床内气固流动及混合行为的CFD-DEM模拟

赵永志 程易 丁宇龙 金涌

清华大学化工系

收稿日期 2006-6-26 修回日期 2006-9-19 网络版发布日期 2007-6-20 接受日期

摘要 采用计算流体力学和离散单元模型(CFD-DEM)耦合一种简单的气固催化反应模型对具有不同入口结构的二维下行床内的气粒流动和混合行为进行全床数值模拟。模拟得到了不同入口结构下行床内的多尺度气固运动状态、全床的固含、速度及反应生成物浓度分布,以及气体和颗粒在下行床内的停留时间分布,发现入口结构对反应器内的流动、混合和气固接触效率起着关键性的作用,入口气体和颗粒的不均匀分布将导致下行床内气体停留时间的宽分布以及气固接触效果的恶劣。

关键词 [下行床](#) [入口结构](#) [气固接触](#) [计算流体力学](#) [离散单元法](#)

分类号

CFD-DEM simulation of the flow and mixing behaviors in downer with different entrance structures

ZHAO Yongzhi, CHENG Yi, DING Yulong, JIN Yong

Abstract

The gas-solid flow and mixing behavior in two dimensional downers with different entrance structures were simulated by using a CFD-DEM method. A gas-solid catalytic reaction model was incorporated in the governing equations to investigate the contact efficiency between phases. The simulations showed the dynamic and time-averaged flow structures characterized by the distributions of solids fraction, particle velocity and the reaction product in the whole downer as well as the residence time distributions (RTDs) of gas and solids, which were all heavily influenced by the design of the entrance structure. Non-ideal initial contact between gas and solids would cause wide RTDs of gas and worsen the reactor performance.

Key words [downer](#) [entrance structure](#) [gas-solid contact](#) [computational fluid dynamics \(CFD\)](#) [discrete element method \(DEM\)](#)

DOI:

通讯作者 程易 yicheng@tsinghua.edu.cn

扩展功能

本文信息

- ▶ [Supporting info](#)
- ▶ [PDF\(2085KB\)](#)
- ▶ [\[HTML全文\]\(0KB\)](#)
- ▶ [参考文献](#)

服务与反馈

- ▶ [把本文推荐给朋友](#)
- ▶ [加入我的书架](#)
- ▶ [加入引用管理器](#)
- ▶ [复制索引](#)
- ▶ [Email Alert](#)
- ▶ [文章反馈](#)
- ▶ [浏览反馈信息](#)

相关信息

- ▶ 本刊中 [包含“下行床”的相关文章](#)
- ▶ 本文作者相关文章
- [赵永志 程易 丁宇龙 金涌](#)