

多相流和计算流体力学

## 颗粒移动床内不稳定运动的计算颗粒动力学模拟

赵永志, 程易, 金涌

清华大学化学工程系, 绿色反应工程与工艺北京市重点实验室

收稿日期 2006-10-16 修回日期 2006-11-25 网络版发布日期 2007-8-20 接受日期

摘要

采用考虑滚动摩擦的三方方程离散单元法 (DEM) 模型对侧开孔的移动床中的颗粒流动进行了数值研究。结果表明, 计算颗粒动力学 (CGD) 方法可对复杂颗粒系统内颗粒的运动行为进行准确的预测, 包括时均速度场和脉动速度场。讨论了模型中颗粒摩擦参数的重要影响, 并对颗粒流动表现出的间歇现象进行了分析。颗粒流动与流体流动有相似之处, 都存在随机的脉动, 但颗粒流的随机脉动机理与流体中的湍流机理有很大不同, 颗粒流动会表现出很强的不连续性。

关键词

[离散单元法](#) [计算颗粒动力学](#) [移动床](#) [数值模拟](#)

分类号

## Computational granular dynamics simulation of unsteady movement in particle moving bed

ZHAO Yongzhi, CHENG Yi, JIN Yong

### Abstract

The granular flow in a particle moving bed with a side exit at the bottom was simulated by using a three-equation discrete element method (DEM) model that considers rolling friction. It was demonstrated that the computational granular dynamics (CGD) method can accurately predict the flow behavior of the particles in the complex granular systems, including the time averaged velocity field and the velocity fluctuations. The granular flow had certain similarities to fluid flow, such as the random fluctuation of velocities. However, the physical mechanism for the intermittent behavior in the granular flow was different from fluid flow. The granular flow showed great discontinuity. The friction coefficients of particles, which greatly affected the dynamics in the granular flow were discussed in the numerical simulations.

### Key words

[discrete element method](#) [computational granular dynamics](#) [moving bed](#) [numerical simulation](#)

DOI:

### 扩展功能

#### 本文信息

- ▶ [Supporting info](#)
- ▶ [PDF\(9286KB\)](#)
- ▶ [\[HTML全文\]\(0KB\)](#)
- ▶ [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“离散单元法”的 相关文章](#)
- ▶ [本文作者相关文章](#)

- [赵永志](#)
- [程易](#)
- [金涌](#)