

多相流和计算流体力学

## 三相强制外循环环流反应器内的局部气泡行为

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收稿日期 2006-8-17 修回日期 2006-11-11 网络版发布日期 2007-7-13 接受日期

摘要

为适应新兴的工艺过程, 提出一种带有强制外循环的中心气升式内环流反应器。根据结构特点及流动状态不同, 将强制外循环环流反应器分为6个流动区域, 即环流反应器底部区、气体分布器影响区、浆液进料影响区、导流筒上行区、气液分离区和环隙区。研究了不同流动区域内的局部气泡特性。发现不同流动区域内气泡直径沿径向的分布有较大差异, 倒锥形底部结构显著影响了环流气泡的数量与直径。推导出了不同流动区域内平均气泡直径的理论模型, 模型结果与实验数据吻合较好。

关键词 [环流反应器](#) [气泡直径](#) [气液固三相](#)

分类号

## Local bubble behavior in novel gas-liquid-solid air loop reactor with forced circulation slurry phase

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### Abstract

A novel gas-liquid-solid three-phase internal air loop reactor (IALR) with forced circulation slurry phase was investigated as a new equipment for emerging chemical processes. Based on a systematic analysis of the complex geometrical structure and the variation of flow pattern in the whole reactor space, the reactor was divided into six regions, the gas distributor region, the slurry feed affected region, the draft tube region, the gas-liquid separation region, the annular and the bottom region. Experiments were conducted in order to investigate the local bubble characteristics in different flow regions. The result showed that the radial evolution of bubble size was quite different in different flow regions. The inverted cone bottom dramatically affected the number and size of the circulating bubbles. A mathematic model was established for each flow region, and the model prediction agreed well with experimental result.

### Key words

[internal air loop reactor](#) [bubble diameter](#) [gas-liquid-solid three-phase](#)

DOI:

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