

多相流和计算流体力学

两级气液内环流反应器内气含率和循环液速

于伟, 王铁峰, 汪展文

清华大学化学工程系

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摘要

基于多釜串联可以有效减小返混的原理, 通过引入特殊设计的级间构件构建了一种新型的两级内环流反应器。实验研究了级间构件形式、表观气速、表观液速和气液分离器对每一级内气含率和循环液速的影响。实验结果表明, 表观气速对反应器二级(上一级)中上升管与下降管气含率之差和循环液速影响较大, 而对一级(下一级)的影响较小; 各级内上升管和下降管的气含率均随表观液速的增大而减小, 但影响程度较小。基于推动力和阻力平衡建立了预测反应器中每一级的气含率和循环液速的流体力学模型, 模型预测值与实验结果吻合较好。

关键词

[两级内环流反应器](#) [级间构件](#) [气含率](#) [循环液速](#)

分类号

Gas holdup and liquid circulation velocity in gas-liquid two-stage internal-loop airlift reactor

YU Wei, WANG Tiefeng, WANG Zhanwen

Abstract

Specially designed internals were used in a novel two-stage internal-loop airlift reactor to effectively decrease liquid backmixing by analogy with the tanks-in-series concept. The effects of the inter-stage internal type, superficial gas and liquid velocities and gas-liquid separator on the gas holdup and liquid circulation velocity in each stage were experimentally studied. The results showed that superficial gas velocity had a significant effect on the difference between gas holdups in the riser and the downcomer and liquid circulation velocity in the second stage (the top stage), but had a smaller effect on those in the first stage (the bottom stage). The gas holdups both in the riser and the downcomer slightly decreased with an increase in superficial liquid velocity. A mathematical model for predicting liquid circulation velocity was proposed based on the balance between driving and resistance forces, and a good agreement was obtained between the calculated and experimental data.

Key words

[two-stage internal-loop airlift reactor](#) [inter-stage internal](#) [gas holdup](#) [liquid circulation velocity](#)

DOI:

通讯作者 王铁峰 wangtf@tsinghua.edu.cn

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