

王维忠,蒋文涛,苏仕军,郑庭辉:浆叶埋深与液面高度对JBR内气-液混合影响的数值模拟[J].环境科学学报,2013,33(4):1017-1022

浆叶埋深与液面高度对JBR内气-液混合影响的数值模拟

Numerical simulation on the influences of the impeller submergence depth and liquid height on gas-liquid mixing in JBR

关键词: [软锰矿](#) [烟气脱硫](#) [气含率方差](#) [数值模拟](#)

基金项目: [国家高技术研究发展\(863\)计划项目\(No.2008AA06Z316\)](#)

作者 单位

王维忠 四川大学工程力学系,成都 610065

蒋文涛 四川大学工程力学系,成都 610065

苏仕军 国家烟气脱硫工程技术研究中心,成都 610065

郑庭辉 四川大学工程力学系,成都 610065

摘要: 为了获得软锰矿浆烟气脱硫工艺的最佳运行工况,应用计算流体力学(CFD)方法对其吸收设备——喷射鼓泡反应器(JBR)内气液两相流动进行了三维数值模拟.在FLUENT软件中采用标准 $k-\epsilon$ 湍流模型与Eulerian多相流模型模拟了喷射鼓泡反应器内流场和气液分散特性,并应用气含率方差的概念定量描述气相的分散程度.着重考虑了上浆埋深和液面高度对整体气含率与气含率方差的影响,并对气含率方差与上浆上下含气区高度比 R 的关系进行了分析.结果表明,流场的重要特征与前人的类似实验结果和数值模拟结果一致.上浆埋深与液面高度对JBR内整体气含率和气相的分布具有显著影响.整体气含率随上浆埋深的增加而减小,而随着液面高度的增加,整体气含率先增大后减小.气含率方差随上浆埋深的增加而增大,随高度比 R 的增大而减小.综合分析认为液面高度取260~280 mm为宜,以 R 约为2确定上浆埋深.

Abstract: In order to determine the optimum operating conditions of flue gas desulfurization processes with pyrolusite slurry, Computational Fluid Dynamics (CFD) was adopted to simulate the multiphase flow in Jet Bubbling Reactor (JBR). The standard $k-\epsilon$ turbulent model and Eulerian multiphase flow model were adopted to simulate the flow field and gas-liquid dispersion in JBR, and gas holdup variance was proposed to quantitatively describe the gas dispersion. The effects of the submergence depth of up impeller and the liquid height on overall gas holdup and gas holdup variance were investigated, and the variance of the ratio of upper gas-bearing height to lower gas-bearing height and the gas holdup variance were analyzed. The results showed that the computed gas-liquid flow field agreed well with the experimental and numerical results in the literatures. The submergence depth of up impeller and the liquid height had significant effects on the overall gas holdup and gas holdup variance in JBR. The overall gas holdup was found to decrease with the increase of the depth of up impeller, and it firstly increased and then decreased with the increase of liquid height. In addition, the gas holdup variance increased with the increase of the submergence depth of up impeller, but decreases with the increase of height ratio. It was concluded that a liquid height of 260~280 mm might be the best, and the submergence depth of up impeller can be determined using a height ratio of 2.

Key words: [pyrolusite](#) [flue gas desulfurization](#) [gas holdup variance](#) [numerical simulation](#)

摘要点击次数: 192 全文下载次数: 175

[关闭](#)[下载PDF阅读器](#)

您是第2484700位访问者

主办单位：中国科学院生态环境研究中心

单位地址：北京市海淀区双清路18号 邮编：100085

服务热线：010-62941073 传真：010-62941073 Email: hjkxxb@rcees.ac.cn

本系统由北京勤云科技发展有限公司设计