

催化、动力学与反应器

LDV技术优化膜反应器结构

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摘要

通过采用激光多普勒测速仪(LDV)测定膜反应器内气水混合液的流速分布,研究了膜反应器中设置导流板、膜出水流速以及曝气强度对膜面的剪切流速的影响。研究表明,导流板可以增大混合液在中下部膜面附近的切向上升时均流速,混合液的紊动性增强,进而增强了对膜面的剪切作用,有助于延缓膜面滤饼层的形成,缓解浓差极化现象。增大膜出水流速,混合液上升流速和指向膜面的流速均有所增大。曝气强度也会影响流速。时均上升流速和脉动上升流速与曝气强度符合正对数关系。增大气量后,混合液的紊动性增大,气水混合液对膜面的剪切强度也增大。

关键词

[膜反应器](#) [膜污染](#) [流速分布](#) [剪切力](#)

分类号

LDV optimization of structure of membrane reactor

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Abstract

The flow rate of gas-water mixture in the membrane reactor could be measured with laser Doppler velocimetry (LDV). The impact of deflector, aeration intensity and flow rate of effluent on the shear forces of the membrane surface was investigated. The results showed that the deflector significantly increased the tangential velocity and turbulence of the mixture on the membrane surface. As a result, the shear force on the membrane surface was enhanced and in turn the formation of cake layer was delayed, thus alleviating concentration polarization. The vertical and horizontal velocities increased with increasing effluent flow rate. Also, aeration intensity affected the flow rate of the mixture remarkably. It was found that mean and pulse velocities were positively proportional to aeration intensity in logarithmic relationship, respectively, indicating significant effects of aeration intensity on turbulence and shear forces.

Key words

[membrane reactor](#) [membrane fouling](#) [flow rate distribution](#) [shear force](#)

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