

传递现象

## 带有新型内外组合桨的搅拌设备内流场的数值研究

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**摘要** 以滑移网格法的基本思想为出发点提出了滑移周期的概念. 利用滑移网格法计算了以一定转速比反向旋转的新型内外组合桨搅拌的流场. 通过对双层斜叶平桨、标准锚式桨和新型内外组合桨产生的流场进行对比, 研究了搅拌设备内的宏观流动场、时均速度、速度变化率、剪切速率和轴向循环能力. 结果表明: 滑移周期概念的提出在一定程度上解决了滑移网格法计算周期长、计算成本高的问题. 采用新型内外组合桨, 加强了径向流动和轴向流动, 改善了搅拌设备近壁区的流动状况, 且对假塑性流体流动状况的改善优于牛顿流体. 新型内外组合桨的剪切水平和轴向循环能力均优于双层斜叶平桨.

**关键词** [新型内外组合桨](#) [搅拌设备](#) [数值研究](#) [滑移周期](#)

分类号

## Numerical investigation of flow fields in stirred vessels with novel combined inner and outer agitators

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### Abstract

Based on the basic principle of sliding grid method, a new concept of sliding period was proposed and used to simulate the flow fields in stirred vessels with novel combined inner and outer agitators which are rotating in opposite directions. This work was compared with dual pitched paddles and anchor agitator. The velocity fields, mean velocity components, rates of velocity change, shear rates and axial circulation capability were analyzed. The results showed that the use of the concept of sliding period could reduce the CPU time to a certain degree. By using the novel combined inner and outer agitators, the radial and axial flows were strengthened. The combined inner and outer agitators could improve the flow fields near the vessel wall, and work better for pseudo-plastic fluid than Newtonian fluid. In addition, the shear strength and axial circulation capability of combined inner and outer agitators were higher than dual pitched paddles.

**Key words** [novel combined inner and outer agitators](#) [stirred vessels](#) [numerical investigation](#) [sliding period](#)

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