

传递现象

## 搅拌槽内黏性流体流动的DPIV测量与CFD模拟

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摘要

关键词 [搅拌槽](#) [数字粒子图像测速仪](#) [计算流体力学](#) [黏性流体](#)

分类号

## DPIV MEASUREMENT AND CFD SIMULATION OF VISCOUS FLUID FLOW IN STIRRED TANK AGITATED BY RUSHTON TURBINE

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### Abstract

Mixing, achieved mostly by mechanically stirring, is one of the most important unit operation processes in chemical and related industries. The problem of design and scale-up of stirred tanks has been tackled mainly by means of semi-empirical methods. Measurement and numerical simulation of viscous fluid in a stirred tank is still insufficient and further development is needed. In this paper, computational fluid dynamics (CFD) simulation and digital particle image velocimetry (DPIV) measurement have been carried out to study the flow field of viscous fluid in a stirred tank agitated by a four-blade Rushton turbine. The working medium is a mixture of water and glycerine with various concentrations. The results show the mean velocity, turbulent energy, vorticity and circle flux of the fluids as well as the change of flow patterns with the fluid viscosity. CFD code of CFX with sliding grids was used to simulate the flow field. The  $k-\epsilon$  model and laminar model was selected as the models of simulation. The CFD simulations were compared with the experimental DPIV data. The result shows that the CFD simulations can reflect the flow of the viscous fluid in a stirred tank.

**Key words** [stirred tank](#) [digital particle image velocimetry](#) [computational fluid dynamics](#) [viscous fluid](#)

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