

## 旋流自吸泵内部湍流场大涡模拟 Large Eddy Simulation on Interior Flow Field of Rotational Flow Self-priming Pump

王春林 司艳雷 赵佰通 张浩 郑海霞

江苏大学

**关键词:** 旋流自吸泵 大涡模拟 性能预测 试验 湍流场

**摘要:** 旋流自吸泵蜗壳结构不同于普通泵, 具有特殊的流场结构。采用大涡模拟方法和滑移网格技术, 通过对设计工况下旋流自吸泵三维非定常湍流场的数值计算, 捕捉到泵叶轮和蜗壳内的压力分布、速度分布和尾迹区内旋涡的结构与演化特征等重要流动信息, 结果表明叶轮内部静压具有一定的非对称性。分析了分离室内旋涡形成的原因。对含气率分布的分析表明, 叶轮中气相主要集中于叶片的吸力面区域。对旋流自吸泵的性能进行预测, 得到了预测性能曲线, 并将预测结果与性能试验结果作了对比, 证明了大涡模拟法能够较准确地预测旋流自吸泵内部流动特性和性能。Rotational flow self-priming pump's volute is different from conventional pump, with special flow structure. 3-D unsteady turbulent flow of rotational flow self-priming pump under design condition was simulated by using large eddy simulation method and sliding mesh technique. In the impeller and volute, pressure distribution, velocity distribution and vortex's structure and evolution characteristics of wake region and other flow message were captured. The results showed that static pressure is asymmetric in impeller. And the reason for vortex forming in separation chamber was analyzed. The gas fraction distribution shows that gas phase mainly centers on the blade suction interface zone in the impeller. Performance prediction was carried out and performance curves were gotten. The performance experiment results was conducted and compared with prediction results. Large eddy simulation was accurate in predicting performance and interior flow characteristics.

[查看全文 \(请使用Adobe Acrobat 6.0版本浏览\)](#) [返回首页](#)

[引用本文](#)