离心泵流道中固体颗粒速度场的粒子成像测速(PIV)分析与研究

Particle Image Displacement Velocity (PIV) and Velocity Field of Solid Particles in Centrifugal Pump

投稿时间：1998-3-23

稿件编号：19980321

中文关键词：离心泵,ＰＩＶ,固体颗粒,速度分布

英文关键词：centrifugal pump， Particle Image Displacement Velocity (PIV)， solid particle, velocity distribution

基金项目：清华大学科学研究基金

作者	单位
许洪元	清华大学
卢达熔	清华大学
焦传国	清华大学
罗先武	清华大学

中文摘要：

粒子成像测速（ＰＩＶ）技术是随高速摄影技术和计算机图像处理技术发展起来的一种速度量测技术。该文将ＰＩＶ技术应用于离心泵流道中固粒速度场的研究。开发了一套Ｗｉｎｄｏｗｓ界面的速度分析软件，分析了具有不同物理特性的橡皮泥、核桃壳和砂子等固体颗粒在流道中的运动。研究表明固粒的密度影响其在叶轮中的相对运动轨迹，固粒的粒径和形状则主要影响其运动速度大小；揭示了开式叶轮比闭式叶轮效率低、磨损快的原因是固粒受到水流泄漏的影响，其相对速度比在闭式叶轮中的大。研究结果有助于解释离心泵内磨粒磨损现象。

英文摘要：

The PIV technique is a brand new technique of measuring velocity. It started in the 1980s with the development of high speed photography and the image processing technique of computers. This paper deals with PIV applied to the study of solid particles velocity in the flow passage of centrifugal pumps. A set of software with Windows interface was developed to analyze the flow motion of such solid particles as rubber balls, walnut shell fractions and sand with different physical properties in the flow passage. The study shows that the density of solid particles has important effects on the relative trajectory of particles, the shape and size of solid particles mainly affect the amount of particles' velocity. As to half open type impellers, the flow between blades and the pump cover being influenced by leakage, the relative velocity of particles is greater than that in the closed type ones. So the reasons why the efficiency of open type impellers is lower than that of close type ones and open type impellers are easy to wear are revealed. Results of the study are helpful for explaining abrasion in centrifugal pumps.

查看全文 关闭 下载PDF阅读器