

双流道及双叶片式叶轮内流场的PIV测量与比较

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关键词: 叶轮 双流道 双叶片 PIV测量

摘要: 为研究双流道叶轮与普通叶片式叶轮的内部流动区别,设计制作了满足粒子图像测速仪(PIV)测量要求的模型泵,模型泵的叶轮有双流道和双叶片2种形式。用PIV分别测量了双流道叶轮和双叶片叶轮的内部流动,并自编程序对测量所得绝对速度进行分解,得到相对速度。由测量结果可知:在双叶片叶轮内,流体基本沿叶片吸力面流动,叶片压力面上的相对速度较低,在压力面出口出现了速度很低的回流区,有明显“射流-尾迹”特征。双流道叶轮内流动也不均匀,但没有出现明显的回流区,流态较好。流量改变时2种叶轮内的流动变化规律一致,随着流量增大,相对速度逐渐增大、绝对速度减小,设计工况下叶轮内的流态最好,小流量工况下流动扩散严重。In order to study the flow characteristics inside the double-channel impeller, a testing pump was designed and produced according to the special requirements for PIV measurement with two different impellers, i. e., the double-channel impeller and the two-blade impeller. The absolute flow fields inside the two impellers were measured respectively by PIV, and transferred to relative flow fields by special developed code. The results indicated that in the two-blade impeller, the fluid mainly flowed along the suction side, the velocity is very small on the pressure side, and a typical jet-wake flow has been observed. In the double-channel impeller, the flow has better flow pattern without obvious back-flow area. Under different operating conditions, the flow inside two impellers changed, with the increase of flow rate, the relative velocity became larger, while the absolute velocity became smaller. For both impellers, the best flow pattern has been observed under the design condition, and serious dispassion occurred under the smallest flow rate working condition.

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