

## 双吸式叶轮内流三维数值模拟及性能预测

### 3D numerical simulation and performance prediction of double-suction impeller

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英文关键词: double-suction impeller; 3D numerical simulation; performance prediction

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中文摘要:

以时均化的N-S方程和考虑旋转与曲率影响的修正的k- $\epsilon$ 湍流模型为基础,在贴体坐标系中运用SIMPLEC算法,对双吸式离心叶轮内流进行三维湍流数值模拟。计算得到叶轮内的速度、压力场分布,预估了扬程、水力效率并与试验值进行对比。计算结果表明,在双吸式叶轮中,从叶轮进口到出口压力逐渐增加;在叶片区域,处于前盖板和对称面之间的中间截面上,叶片工作面附近的压力明显大于背面附近的压力,且从对称面到前盖板各中间截面上的压力梯度显著增加;流动关于对称面对称,在对称面上不存在轴向速度;设计工况下叶轮出口断面上压力分布明显比其它工况均匀,因此水力效率最高。

英文摘要:

On the basis of time-averaged N-S equation and k- $\epsilon$  turbulent model, the inner flow of double-suction impeller was calculated in 3-D body-fitted coordination by applying SIMPLEC algorithm. The velocity, pressure distributions in impeller were obtained and used to analyze pump performance under different working conditions. The calculation results indicate: in double-suction centrifugal pump impellers, the static pressure gradually increases from the inlet to outlet; in any mid-plane between the shroud and symmetric plane, the static pressure in the pressure side is obviously larger than that in the suction side of vanes, and the pressure gradient increases as the location of mid plane changes from the symmetric plane side to the shroud side; the flow is symmetric and there is no axial velocity on the symmetric plane; the static pressure distribution on the outlet of impeller is much more uniform in designed working condition than in off-design working conditions.

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