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论文

汽轮机叶栅内湿蒸汽两相凝结流动的数值研究

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摘要：

对存在自发凝结的湿蒸汽两相流动进行研究，在欧拉/欧拉坐标系下建立数学模型。气相采用N-S方程，液相凝结过程应用对所构造的多阶参数积分方法进行求解，对汽轮机叶栅中跨音速两相流动进行了数值模拟。与实验数据对比，结果正确预测了凝结冲波的位置和强度，证明所采用模型的准确性和全面性。由液相参数的分布和变化趋势可知吸力面汽流膨胀率和尾缘处蒸汽流动情况是影响主流中液相参数分布的主要因素。

关键词： 湿蒸汽 两相流动 自发凝结 数值模拟 液相参数积分法

Numerical Simulation of Wet Steam Two-phase Flow in Turbine Cascade

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Abstract:

A Eulerian/Eulerian model was developed for calculation of the wet steam flows with spontaneous conden- sation. The model was implemented within a full Navier- Stokes viscous flow solution procedure, and the process of condensation was calculated by quadrature method of moments. A numerical simulation of condensing flow in a turbine cascade was performed, good agreement was obtained between the numerical results and experimental data. The calculation accurately predicts the position and strength of condensing shock wave. The distribution of droplets and it's variety current show that the expansion rate of steam on suction surface and the flow around the trailing edge are main influence factors.

Keywords: wet steam two-phase flow spontaneous condensation numerical simulation quadrature method of moments

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