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层板冷却涡轮叶片前缘内部流动与传热特性实验

Experiment on flow and heat transfer characteristics inside leading edge of lamilloy cooling turbine blade

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中文关键词: [层板](#) [涡轮叶片前缘](#) [扰流柱](#) [流动阻力](#) [表面传热系数](#)

英文关键词: [lamilloy](#) [leading edge of turbine blade](#) [pin-fins](#) [flow resistance](#) [surface heat transfer coefficient](#)

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中文摘要:

基于相似理论, 对简化的层板冷却涡轮叶片前缘放大模型内部的流动与传热特性进行实验研究, 对比了无绕流柱和带菱形扰流柱两种实验模型的流动阻力系数、靶面温度和表面传热系数的分布. 实验中采用红外热像技术测量换热面的温度, 采用ANSYS软件计算换热面的局部热流密度. 结果表明: 两种模型的流动阻力随进气雷诺数逐渐增大, 带菱形扰流柱模型的流动阻力总体上较大; 靶面局部表面传热系数的分布特征基本相同, 带菱形扰流柱模型的局部表面传热系数比无扰流柱模型的稍高; 靶面平均表面传热系数的差别很小, 相同进气雷诺数下带菱形扰流柱模型的平均表面传热系数数值最大大7%.

英文摘要:

Base on similarity theory, experimental investigation of flow and heat transfer characteristics were conducted on two amplificatory leading edge models of lamilloy colling turbine blade, including one model with rhombus pin-fins and the other without pin-fins, the flow resistance coefficient, temperature and surface heat transfer coefficient on target surface were compared between two models. The temperature was measured by infrared thermograph technique, and the local heat flux density was simulated by ANSYS. The results show that the flow resistance of two models increases gradually with the increase of inlet Reynolds number. And the model with rhombus pin-fins has larger flow resistance on the whole. The distribution of local surface heat transfer coefficient on the target surface of two models is similar while the model with rhombus pin-fins has slightly higher value. The difference of average surface heat transfer coefficient for the target surface of two models is also little and the value of the model with rhombus pin-fins is at most 7% larger than the that of other model at the same inlet Reynolds number.

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