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多相流和计算流体力学

旋流腔结构对涡流二极管性能及流动影响的数值模拟

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摘要

为了探讨旋流腔结构对涡流二极管正向流动和反向流动的影响，分别采用RNG κ-ε 湍流模型和 κ-ε 湍流模型进行了数值模拟，模拟结果与实验数据吻合良好。在此基础上，计算分析了旋流腔结构型式及几何尺寸对正向流动和反向流动的影响，并得到了旋流腔的优化结构。结果表明：渐缩型旋流腔反向阻力系数最大;薄板型正向阻力系数最小;渐缩型综合性能最佳，可以在原型基础上提高30%。渐缩型旋流腔中心高度应根据等流速设计原则，其最佳值略小于轴向出口管直径的1/4。

关键词

涡流二极管 旋流腔 阻力系数 优化

分类号

Numerical simulation of effect of swirling chamber structure on performance and flow in vortex diode

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Abstract

umerical simulations employing RNG κ-εturbulent model and κ-εturbulent model respectively were made to investigate the effect of swirling chamber structure on the forward flow and reverse flowNumerical results were in good agreement with experimental data Based on the numerical simulation，computations with different structures and geometrical parameters were performed for both flow directionsThe optimal structure was obtainedThe results showed that the converging chamber had the largest resistance for the reverse flow，the thin cylindrical chamber had the smallest resistance for the forward flow As to the overall performance，the converging one is the best，with an increase of 30% The height of the chamber center should be designed following the equivalent velocity principle，and the best value was slightly less than 1/4 of the diameter of the axial pipe.

Key words

vortex diode swirling chamber resistance coefficient optimization

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