

传递现象

内插旋流片的管内流动与换热的数值模拟

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收稿日期 2006-10-30 修回日期 2007-6-22 网络版发布日期 2007-10-11 接受日期

摘要

通过数值模拟,详细考察了光管内间隔插有旋转角为 $270.^\circ$ 、旋流角为 38.1° 旋流片的速度场与热流场的分布特性及其相互间的协同,并对4种旋流片的场协同数进行了比较。结果表明,在同样Reynolds数下,根据场协同数的大小来排列的旋流片类型依次为270-38.1、180-38.1、270-20.3、180-20.3,且与传热性能高低排列是一致的。通过改善速度场与温度梯度场的协同程度是提高换热性能的一个有效手段,且内插旋流片能有效地改善速度场与温度梯度场的协同程度从而提高换热性能。

关键词

[旋流片](#) [场协同](#) [数值模拟](#) [强化传热](#)

分类号

Numerical simulation of flow and heat transfer in a tube inserted with twisted leaves

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Abstract

The field coordination between velocity and heat flow fields in a tube inserted with twisted leaves discontinuously was analyzed in detail, and the field coordination number F_C of four kinds of twisted leaves was compared with each other respectively by numerical simulation. The results indicated that the sequence of twisted leaves was 270-38.1 (a type of twisted leaf with twist angle $\alpha = 270^\circ$ and swirl angle $\beta = 38.1^\circ$), 180-38.1, 270-20.3 and 180-20.3 based on F_C from high to low in the same value of Re , and it was in agreement with that based on heat transfer performance from high to low. It was an effective method for heat transfer enhancement to improve field coordination. The inserted twisted leaves effectively improved the coordination between velocity and temperature gradient fields in the tube, thereby the heat transfer performance was enhanced.

Key words

[twisted-leaves](#) [field coordination](#) [numerical simulation](#) [heat transfer enhancement](#)

DOI:

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