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传递现象

非等宽微通道阵列速度均布的优化设计

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摘要

通过建立微通道阵列和分布腔之间压降和流量的关系方程式，对等宽微通道之间的速度分布进行了分析，结果表明，通过改变微通道宽度值是实现速度均匀分布一种相对可行的方法。提出一个非等宽微通道阵列模型，即每个微通道的宽度不尽相等，并采用一个优化程序来计算每个微通道宽度值，实现微通道之间速度的均匀分布。结果表明，经优化后的模型有可能是等宽或非等宽微通道模型，所优化的微通道宽度值的分布有可能对称或非对称分布;经优化后的微通道之间的速度分布得到了比较理想的分布，但没有实现真正的均匀分布，这与计算过程产生的误差和尺寸变量的选择有关系。

关键词

非等宽微通道 速度均布 微设备 优化设计

分类号

Optimal design for velocity uniformity among unequal-width microchannels

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Abstract

The velocity distribution among equal-width microchannels was studied with an established equation set concerning the relationship of pressure drop and flow rate between microchannels and manifolds. The results indicated that it was feasible to achieve velocity uniformity by changing the microchannel width.A model of unequal-width microchannels was developed in this work.The microchannel widths were not equal to each other, and an optimization procedure was proposed to work out the value of each microchannel width for realizing velocity uniformity.The results showed that the optimal model might be an equal-width or unequal-width one, and the distribution of optimal microchannel widths was likely to be symmetrical or asymmetrical.The optimal model could achieve relatively ideal velocity distribution, but was hardly uniform distribution due to the errors in calculations and the selection of dimensional variables.

Key words

unequal-width microchannels velocity uniformity microdevice optimal design

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