

传递现象

超疏水表面微通道内水的流动特性

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摘要

在铝制微通道内壁上制造出超疏水表面, 水滴在其表面上的接触角达到 153° 。对水在内径同为0.60 mm的超疏水微通道和超亲水微通道中流动的压降进行实验测定与对比, 得出水在超疏水微通道内的流动阻力降有明显降低, 降低的最大值可达25%。研究了水在超疏水微通道内的流动特性, 发现水由层流向湍流转变发生在Reynolds数为2500左右, 且在层流范围内 fRe 值基本保持不变。通过计算得出了不同流量下水在超疏水表面微通道壁面处的滑移速度和滑移长度, 结果显示滑移速度和滑移长度均随流量的增大而增大。

关键词

[超疏水](#) [微通道](#) [阻力降](#) [转变](#) [滑移速度](#) [滑移长度](#)

分类号

Flow characteristics of water in microchannel with super-hydrophobic surface

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Abstract

In the inner wall of aluminium microchannel, super-hydrophobic surface was fabricated. The water contact angle on the surface reached 153° . The pressure drop of water flowing in a 0.60 mm-diameter super-hydrophobic microchannel evidently decreased compared with that in super-hydrophilic microchannel, with the maximal decrease of about 25%. The flow characteristics of water in the microchannel with super-hydrophobic surface were studied. It was found that the critical Reynolds number for the transition from laminar flow to turbulent flow was approximately 2500 and in laminar flow the values of fRe were almost constant. The slip velocity and the slip length were calculated at different flow rates and the results showed that both the slip velocity and slip length increased with increasing water flow rate.

Key words

[super-hydrophobic](#) [microchannel](#) [pressure drop](#) [transition](#) [slip velocity](#) [slip length](#)

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