Free convection characteristics in a vertical minichannel with two grooves

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ABSTRACT

Free convection characteristics are investigated in a vertical minichannel with two grooves. The wall geometry of the minichannel has grooved shapes with several modified groove ratios. To find the effects of natural convective heat transfer, the finite volume numerical method is used. For the case of two grooves, there are four flow separations at $d/D = 0.5$. Heat transfer patterns are similar to the single groove case. However, at the ending section of the first groove temperatures spread out to the downstream. In the case of the 1 mm distance case between grooves, the Nusselt number shows larger variation compared to the other cases. When the channel pitch is 3 mm, the position location between grooves is not a large factor after 2 mm groove distance.

Keywords: Free convection; finite volume scheme; Groove; heat transfer; Minichannel