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INVESTIGATION ON HEAT TRANSFER OF SUBMERGED WATER JET IMPINGEMENT ON MICRO-CHANNEL HEAT SINK

Abstract

With rapid development of industry, electronic products are developing towards compactness and high functionality, and the heat dissipated per unit volume increases continuously. Thus, how to dissipate heat effectively is the important topic for related industries. The conventional straight micro-channel heat sink which has been considered as an effective heat removal tool has the attributes of simple structure, large convective heat transfer coefficient and high surface area to volume ratio. But the increase of temperature of the object to cool in the direction of the fluid flow againsts cooling electronic components. For submerged jet impingements, the way to obtain a quite uniform temperature distribution is the use of matrix of jets, which has thinner temperature boundary, higher temperature gradient and larger heat exchange coefficient by fluid perpendicular impinging cooled object. The micro-channel heat sink combined with submerged jet impingement not only has large heat exchange coefficient but also improves the temperature uniformity of the cooled object. In this paper, performance of micro-channel heat sink combined with submerged jet impingement for high heat flux density cooling was simulated with numerical method. To compare performance of heat sinks with different dimensions and nozzle with different arraying forms, an optimization method was developed whose objective heat transfer coefficient with constraint condition of pumping power.