

Thermal Performance of a Pair of Synthetic Jets Equipped in Microchannel

Authors : J. Mohammadpour, G. E. Lau, S. Cheng, A. Lee

Abstract : Numerical study was conducted using two synthetic jet actuators attached underneath a micro-channel. By fixing the oscillating frequency and diaphragm amplitude, the effects on the heat transfer within the micro-channel were investigated with two synthetic jets being in-phase and 180° out-of-phase at different orifice spacing. There was a significant benefit identified with two jets being 180° out-of-phase with each other at the orifice spacing of 2 mm. By having this configuration, there was a distinct pattern of vortex forming which disrupts the main channel flow as well as promoting thermal mixing at high velocity within the channel. Therefore, this configuration achieved higher cooling performance compared to the other cases studied in terms of the reduction in the maximum temperature and cooling uniformity in the silicon wafer.

Keywords : synthetic jets, microchannel, electronic cooling, computational fluid dynamics

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