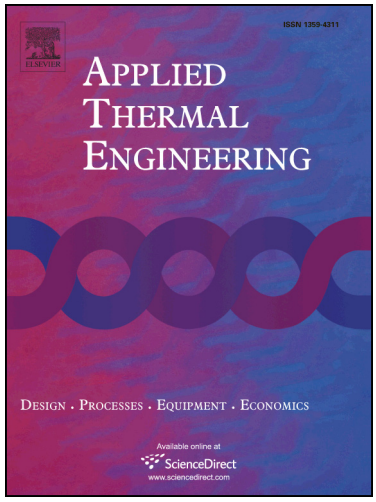

Multi-parameter optimization for micro-channel heat sink under different constraint conditions

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Multi-parameter optimization for micro-channel heat sink under different constraint conditions

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***Abstract*:** This paper, for specific chips geometrics of 10mm*10mm, the micro-channel heat sink is designed and optimized. Three dimensionless variables are defined as width ratio of chip to channel pitch (N), the width radio of channel to pitch (I) and aspect ratio (α_c). The optimal designs of MCHS based on minimum thermal resistance is performed at one or more constraint conditions of fixed inlet volume flow rate, fixed pressure drop and fixed pumping power. Results show the thermal resistance can reach smaller for fixed volume flow rates, but the pressure drop even increased to 350kPa unacceptable in application. Similarly results are found for the fixed pressure drop or pumping power. Multiple constraint conditions are used to optimize channel sizes for a better thermal performance with acceptable pressure drop penalty. An interesting phenomenal is found the best thermal structure can be got of 200ml/min, but not 400ml/min under pressure drop less 50kPa and pumping power less 0.5W, which average temperature of 200ml/min is 308.4K, but 312.17K of 400ml/min. The required flow rate is from 146-225ml/min and channel structures are N from 92-110, I=0.6 and H_c=350μm under limitations of pressure drop of 30-70kPa and pumping power less 0.5W.

***Keywords*:** thermal optimization, micro-channel heat sink, multiple constrain conditions, fluid flow, heat transfer