

微型热驱动回路的脉动及位差对热性能的影响

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摘要 以甲醇为工质, 采用高速数据采集系统测定了微型热驱动回路在不同运行参数下的压力及温度脉动, 其脉动周期及脉动幅度随蒸发段热流密度的增加而减小. 实验发现, 在蒸发段热流密度较低的情况下, 蒸气管中是泡状流或弹状流交替存在, 而在蒸发段热流密度较高时, 蒸气管中为环状流. 就位差对热性能的影响进行了详细的实验研究, 并在冷凝器空气自然对流和强迫对流情况下, 以加热块温度 90°C 为上限, 得出微通道蒸发器和冷凝器在不同位差下的最大蒸发段热流密度. 通过对实验现象的观察及分析, 以期开发出适用于未来电子产品高功率需求的微型化电子冷却器.

关键词 [微型热驱动回路](#), [脉动](#), [微通道蒸发器](#), [冷凝器](#), [位差](#)

分类号

Oscillation and elevation difference of thermally driven two-phase on its thermal performances

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Abstract

A high speed data acquisition system was used to detect the pressure and temperature oscillations of the thermally driven two-phase loop for different operation parameters using methanol as working fluid. The oscillation time period and the amplitudes are smaller at high heat flux than those at low heat flux. It was found that bubbly flow or slug flow exists in the vapor line at low heat flux, while the annular flow exists at high heat flux. In addition to these, the effect of the relative elevation difference between the evaporator and the condenser on the operation of the thermally driven two-phase loop was studied. The maximum heat flux of evaporator was obtained with the pure natural or the forced air convection of the fin heat sink condenser under the condition of the upper limit temperature of 90°C of the heating block. The present study is to provide guidelines for the design and operation of the miniature electric cooling.

Key words [thermally driven two-phase loop](#) [oscillation](#) [evaporator](#) [condenser](#) [elevation difference](#)

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