

传递现象

## 回路脉动热管运行稳定性分析

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摘要

以简单回路脉动热管为热力系统, 通过热力学分析, 导出了系统的热平衡条件和稳定循环的特征, 得到系统耗散功和系统体积功的关系, 以及用水作为工质时膨胀功与汽化压力的关系。结果显示: 耗散功是维持系统稳定运行的必要条件, 且蒸发端的吸热量应等于冷凝端的放热量; 稳定循环时, 蒸发端的压力和温度必高于冷凝端; 循环过程中工质的汽化膨胀功必大于冷凝压缩功, 其差值用于克服系统耗散功; 水的汽化功与汽化压力呈抛物线形变化, 最大值分别出现在2.5 MPa, 225℃。

关键词

[回路脉动热管](#) [稳定循环](#) [耗散功](#) [体积功](#)

分类号

## Steady state circulation flow analysis of loop pulsating heat pipe

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### Abstract

The heat balance and characteristics of steady state circulation flow of a single loop pulsating heat pipe was studied with thermo-mechanical analysis. The relationship of system dissipation work and volume work when the system was running stably and the relationship of water vapor expansion work and saturated pressure with water as working fluid were established. The results showed that dissipation work was necessary to keep stable running, and the heat absorption from the evaporator section must be equal to the heat release from the condenser section. The temperature and pressure of the evaporator section must be higher than those of the condenser section. The water vapor expansion work must be higher than the condenser compression work, and the difference was used to overcome system dissipation work. The graph of water vapor expansion work distribution and its variation with saturated pressure was presented, with a maximum work at pressure 2.5MPa and temperature 225℃.

### Key words

[loop pulsating heat pipe](#) [steady state circulation flow](#) [dissipation work](#) [volume work](#)

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