

## عنوان مقاله:

Modeling of A Single Turn Pulsating Heat Pipe based on Flow Boiling and Condensation Phenomena

## محل انتشار:

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## خلاصه مقاله:

Demand for high-performance cooling systems is one of the most challenging and virtual issues in the industry and Pulsating heat pipes are effective solutions for this concern. In the present study, the best predictor correlations of flow boiling and condensation are taken into account to model a single turn pulsating heat pipe mathematically. These considerations, result in derivation of more accurate results. The nucleate boiling phenomenon has been considered as the dominant mechanism of the boiling process in the evaporator. However, due to the annular flow assumption, a thin film of liquid is considered in calculation of the mass transfer out of the vapor plugs. All the fundamental relations such as momentum, mass and energy equations are solved implicitly, except the energy equation of liquid slug. The liquid slug displacement results are compared with the previous studies and the comparison indicates increase in both the frequency and the amplitude of the slug displacement. Moreover, the calculated heat flux is verified with the empirical results. The comparison shows an acceptable agreement between the findings, which is better than previous modelings without boiling and condensation. Furthermore, the effect of pipe diameter on the flow and heat transfer mechanisms has been derived. According to the results, by increasing the pipe diameter, despite a frequency decrease, the oscillation amplitude of liquid slug and total heat flux transferred into the pulsating heat pipe increases. Sensible heat contribution in the heat transfer mechanism reduces by higher pipe diameter values.

## کلمات کلیدی:

Pulsating heat pipe, Flow Boiling, Flow Condensation, Numerical modelling

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