ABSTRACT

Title of Thesis: EXPERIMENTAL INVESTIGATION INTO THE HEAT TRANSFER MECHANISM OF OSCILLATING HEAT PIPES USING TEMPERATURE SENSITIVE PAINTS

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Oscillating heat pipes (OHPs) represent a promising passive mechanism for the removal or spreading of heat. While simple to construct, the fluid and thermodynamics of these devices are still poorly understood. There is debate over whether the primary heat transfer mechanism is due to sensible heating of the liquid phase or due to latent heat transfer through phase change. To provide experimental data answering this question, an experimental apparatus was constructed to provide local temperature and heat transfer data across the face of an OHP during operation. This experiment utilized temperature sensitive paint alongside visual recording of the fluid motion in order to determine the relative latent and sensible contribution to the overall heat transfer. The OHP was tested with input powers ranging from 2.6 W to 10.1 W. It found that latent heat transfer was dominant, representing between 65% and 85% of the total heat transferred in all cases.