Public Abstract
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Graduation Term:SS 2008
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Degree:MS
Title:TWO-PHASE FLOW DYNAMICS BY REAL-TIME NEUTRON IMAGING IN OSCILLATING HEAT PIPE

Neutron imaging produces unique images of objects because of neutronsâ€™ unique interactions with atoms making it a useful non-destructive technique with various applications in science and industry. Oscillating heat pipes (OHP) are being studied as a higher performance way of cooling high power electronics. They have shown better performance than conventional heat pipes, but little is known about the flow dynamics of the liquid and vapor inside the OHP. Neutron imaging was used to examine these dynamics by calculating the liquid and vapor volume fractions in different sections of the OHPs. The results were compared with external temperature data to investigate the workings of the OHP. The results show that neutron imaging is a useful technique to quantify the dynamics of vapor and liquid in OHPs. Imaging shows that at lower heat fluxes water does not circulate around the heat pipe as it does at higher heat fluxes. In contrast, acetone circulates around the heat pipe at both lower and higher heat inputs. An acetone-OHP showed better performance than a water-OHP due to more active liquid movement. Temporal volume fraction events in the OHP correspond well with temperature events. It is estimated that results and suggestions from these studies will help to understand of dynamics of fluids in OHPs and aid in designing them for electronic cooling applications.