MS Thesis Defense Announcement
Mechanical and Aerospace Engineering Department
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Design and Optimization of Additively Manufactured Heat Sink and Heat Spreader for Microelectronics Cooling

By

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Abstract

High performance cooling is a critical requirement for modern microprocessors that generate large amounts of non-uniformly distributed heat. Metal heat spreaders and heat sinks have been traditionally used for thermal management. While the design of these components has traditionally been restricted by manufacturability, in recent years, additive manufacturing has offered the capability to manufacture almost any design. This work analyzes and optimizes the performance of an additively manufactured heat sink and heat spreader. Computational heat transfer simulations are carried out to understand the variation of chip temperature and pressure drop for various designs. Discussion of key findings include the thermal performance improvement by doing a parametric study on the designs, both the heat sink and heat spreader. The features that were important in either of the designs for a better cooling will be given an emphasis. The changes in design that needed to be made for a successful print of the heat sink using DMLS will also be presented.