Thesis
&
Graduate Seminar

Speaker

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Analytical Solutions of 3D Heat Conduction in Flux Channels with Nonuniform Properties and Complex Structures

Abstract:

In the microelectronic industry, thermal issues due to self-heating are major problems that affect the performance, efficiency, and reliability of devices. The recent trend of producing advanced devices with smaller sizes, high power densities, and extreme performance makes thermal management an increasingly important factor in the development of microelectronic systems. In most applications, the microelectronic systems are modeled as rectangular flux channels, where heat is generated in one or more small heat-source areas and flows by conduction through the system to spread the heat into a larger convective heat-sink area, where the generated heat is then transferred by convection into an ambient fluid.

In this talk, we present analytical solutions for the temperature distribution and thermal resistance in three-dimensional (3D) flux channels with nonuniform properties and complex structures using some mathematical transformations and techniques. Moreover, verification of the analytical solutions with numerical simulations based on the finite element method (FEM) will be discussed.