Abstract Submitted
for the OSF17 Meeting of
The American Physical Society

Thermoelectric Analysis in the Peltier Modules SANGHWA (CHRIS) LEE , RICHARD KYUNG, Choice Research Group — Peltier module is the micro-electromechanical systems (MEMS) based on thermoelectric devices suitable for micro-power generation, heating and cooling applications. This paper presents the model implementations and verification of thermoelectric modules using numerical and computational analysis. The heat conductivities and electric fields for the proposed models were simulated and analyzed. For completeness, the thermal capacitances of the parts of the thermoelectric module, such as capacitances of semiconductors and the capacitances of thermal contacts were considered and calculated to find optimized geometric shapes of the Peltier modules. In this research, a single and multi stage thermoelectric module were used to find the performance of the modules using relevant physical and mathematical equations to describe the performance of a single and multi stage thermoelectric module. Numerical data, such as geometric variables, temperature values were used to calculate heat conductions. Calculations of the capacitances and electric fields of the modules were also performed taking examples using numerical and computational analysis.

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Date submitted: 15 Sep 2017 Electronic form version 1.4