

Public Abstract

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Department:Mechanical & Aerospace Engineering

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Title:Electron Emission Thermal Energy Conversion

Demand for alternate energy sources and reduced power consumption has driven a need for waste heat recovery. Waste heat is a byproduct of another process that is typically discarded into the surrounds. Electron emission can be used as a method for converting waste heat into electricity. Waste heat used to produce a temperature delta between two electrodes can drive a net current and produce a voltage potential. Concepts using electric and magnetic fields electron emission based power generators are reoriented to minimize thermal inefficiencies in the traditional diode designs. Analytic and numeric modeling is performed at a system level to include coupled emission and thermal models. The coupled models allow for estimations of device energy conversion efficiencies and highlights potential areas for optimization of the generators. Feasibility of waste heat from a computer application using the device concept models is investigated and shown to have some promise in reducing power consumption.