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Non-linear thermoelectric nano-device with electron-phonon interactions BRADLEY NARTOWT, SELMAN HERSHFIELD, KHANDKER MUTTALIB, University of Florida — We consider electron transport through a single (tight-binding Hamiltonian) site and a localized phonon, about which are placed two leads at disparate chemical potentials due to being at disparate temperatures (the usual thermoelectric regime). In a calculation patterned after the large body of zero-temperature work done in the driven regime (where an external agent maintains the chemical potential difference), non-equilibrium Green functions are used to obtain the nonlinear current-voltage characteristics. The Green functions are calculated using the self-consistent Born approximation to incorporate (at the Hartree-Fock-diagram level) interactions between the itinerant electrons and localized phonon-mode. In the thermoelectric regime, we evaluate the power and efficiency of the device as a function of the electron-phonon coupling at various temperature differences. In addition, we will report studies of a new regime where an external driving agent and a temperature-difference are both responsible for the chemical potential difference: the partially-driven thermoelectric regime.

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