Design of heat pumps with parametrically driven linear electrical circuits

J. N. Freitas and M. Esposito[a]

Physics and Materials Science Research unit, University of Luxembourg.

We present a general formalism to analyze the non-equillibrium thermodynamics of linear electrical networks. We consider arbitrary RLC circuits that are parametrically driven and in which different resistors are at different temperatures. We apply this formalism to the study and design of driven refrigerators that are able to pump heat out of a given resistor. Our analytical and numerical methods allow working in the strong-coupling, strong-driving, and non-adiabatic regimes. The fundamental quantum limits for cooling of this kind of refrigerators will be discussed.