Exact Solution for the Heat Conductance in Harmonic Chains

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We present an exact solution for the heat conductance along a harmonic chain connecting two reservoirs at different temperatures. In this model, the end points correspond to Brownian particles with different damping coefficients. Such analytical expression for the heat conductance covers its behavior from mesoscopic to very long one-dimensional quantum chains and validates the ballistic nature of the heat transport in the latter example. This implies the absence of the Fourier law for classical and quantum harmonic chains. We also provide a thorough analysis of the normal modes of system which helps us to satisfactorily interpret these results.