

Non-equilibrium fluctuation for linear diffusion dynamics

Chulan Kwon, Myongji University

We present the theoretical study on non-equilibrium fluctuation for diffusion dynamics driven by linear drift force. We consider a general situation in which non-equilibrium is caused by the combination of two factors: (i) drift force not derivable from potential function and (ii) diffusion matrix not proportional to unit matrix, given by non-identical and correlated noise. Though the latter is not well recognized origin for non-equilibrium compared to the former, it is an unavoidable factor if the system is in contact with multiple heat reservoirs. First we develop the fluctuation theorem for work, heat, and entropy. We also find the exact time dependent probability distribution function which hold both far from and at steady state. Using it we compute cumulant moments for work and discuss the physical implication of our results to non-equilibrium fluctuation. We discuss novel features due to the combination of the two crucial factors for non-equilibrium.