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Initial condition dependence of the probability density function of the injected power in the Langevin equation JAE SUNG LEE, Korea Institute for Advanced Study, CHULAN KWON, Department of Physics, Myongji University, HYUNGGYU PARK, School of Physcis, Korea Institute for Advanced Study — We study the diffusive dynamics of a Brownian particle described by the Langevin's equation with time varying heat bath temperature. Initially (when time $t < 0$) the heat bath temperature is $T_{\rm init}$ and the particle equilibrates with the heat bath. At time $t = 0$, the temperature abruptly changes from $T_{\rm init}$ to T, where their ratio is denoted by $\alpha = T/T_{\rm init}$. Then the particle follows the Langevin dynamics with the temperature T for $t > 0$. Using the path integral method, we compute the probability density function (PDF) of the injection power (injected energy per unit time into the Brownian particle by the random noise, see J. Stat. Phys. 107, 314 (2002)). We find that the PDF or the corresponding large deviation function depends on the initial temperature $T_{\rm init}$ even in the $t \to \infty$ limit. In addition, we show that "phase transition" of the large deviation function occurs at $\alpha = 1/4$.

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