Stationary properties of a Brownian gyrator with non- Markovian baths

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We investigate the stochastic behavior of a non-Markovian version of an elementary Brownian gyrator. The model is defined by overdamped Langevin- like dynamics with a two-dimensional harmonic potential that presents dis- tinct principal axes and is coupled to heat baths at different temperatures. The thermal noises are assumed to be Gaussian, and are related to friction forces through a dissipation memory kernel. The stationary states present rotational motion with non- trivial average torques due to harmonic, friction and fluctuating thermal forces. However, the Markovian limit of the sys- tem exhibits a zero average torque produced by fluctuating thermal forces. For the case of stochastic torque exerted by harmonic force, the cumulant- generating function is calculated exactly. We also study the average heat fluxes in the steady-state regime, where a memory-dependent behavior is observed.