General Path Integral Framework Yielding Effective Markovian Processes

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A consistent Fokker-Planck equation is obtained for a process submitted to the most general form of multiplicative noise, through phase-space functional integration starting from a coupled system of Langevin equations and exploiting Markov and Kramers-Moyal like approximations. In particular, we have analyzed two relevant cases. On one hand, a system corresponding to an 1/f noise, where we show in addition some results for the stochastic resonance phenomena. On the other hand, we analyze the case of the multiplicative noise fulfilling the most general condition for having a noise variable associated to nonextensive statistical mechanics.