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Drifts versus forces: The Ehrenfest theorem for Markovian diffusions. (English)

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Phys. Lett., A 185, No. 2, 149-154 (1994).

Summary: Following Stratonovich, we make a general analysis of the external force manifestations in the dynamics of Markov diffusion processes. The transformation connecting transition densities of the process with the respective (unique) Feynman-Kac kernels induces the local field of accelerations, which equals the gradient of the Feynman-Kac potential and enters the straightforward analog of the Ehrenfest theorem. The latter encompasses not only Nelson's or Zambrini's diffusions but also the familiar non-equilibrium statistical physics processes, like the standard Brownian motion in the external force field (Smoluchowski diffusions).

MSC:

82C31 Stochastic methods (Fokker-Planck, Langevin, etc.) applied to problems in time-dependent statistical mechanics

81P20 Stochastic mechanics (including stochastic electrodynamics)

Full Text: [DOI](#)

References:

- [1] Risken, H., The Fokker-Planck equation, (1989), Springer Berlin · [Zbl 0665.60084](#)
- [2] Blanchard, Ph.; Combe, Ph.; Zheng, W., Mathematical and physical aspects of stochastic mechanics, () · [Zbl 0628.60104](#)
- [3] Stratonovich, R.L., Select. transl. math. statist. probability, 10, 273, (1971)
- [4] Glimm, J.; Jaffe, A., Quantum physics — a functional integral point of view, (1987), Springer Berlin
- [5] Nelson, E., Quantum fluctuations, (1985), Princeton Univ. Press Princeton · [Zbl 0563.60001](#)
- [6] Garbaczewski, P., Phys. Lett. A, 162, 129, (1992)
- [7] Garbaczewski, P.; Vigier, J.P., Phys. Rev. A, 46, 4634, (1992)
- [8] Guerra, F., Phys. Rep., 77, 263, (1981)
- [9] Kac, M., Probability and related topics in physical sciences, (1959), Interscience New York
- [10] Zambrini, J.C., Phys. Rev. A, 33, 1532, (1986)
- [11] Zambrini, J.C., J. Math. Phys., 27, 2307, (1986)
- [12] Garbaczewski, P., Phys. Lett. A, 172, 208, (1993)
- [13] Wilhelm, H.E., Phys. Rev. D, 1, 2278, (1970)
- [14] Ehrenfest, P., Z. Phys., 45, 455, (1927)
- [15] Garbaczewski, P., Phys. Lett. A, 178, 7, (1993)
- [16] Ph. Blanchard and P. Garbaczewski, Natural boundaries for the Smoluchowski equation and affiliated diffusions, submitted for publication.

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