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**Frictionless random dynamics: Hydrodynamical formalism.** (English) Zbl 1005.70014  
*Physica A* 317, No. 3-4, 449-471 (2003).

Summary: We investigate an undamped random phase-space dynamics in deterministic external force fields (conservative and magnetic ones). By employing the hydrodynamical formalism for those stochastic processes, we analyze microscopic kinetic-type “collision invariants” and their relationship to local conservation laws (moment equations) in the fully nonequilibrium context.

**MSC:**

- 70G10** Generalized coordinates; event, impulse-energy, configuration, state, or phase space for problems in mechanics Cited in 3 Documents  
**60H30** Applications of stochastic analysis (to PDEs, etc.)  
**82C40** Kinetic theory of gases in time-dependent statistical mechanics

**Keywords:**

phase-space dynamics; deterministic external force fields; microscopic kinetic-type collision invariants

**Full Text:** [DOI](#)

**References:**

- [1] Heinrichs, J., *Phys. rev. E*, 47, 3007, (1993)
- [2] Masoliver, J., *Phys. rev. A*, 45, 706, (1992)
- [3] Newman, A.L.; Newman, W.I., *Phys. fluids B*, 3, 4, (1991)
- [4] Newman, A.L., *Geophys. res. lett.*, 17, 1061, (1990)
- [5] Ford, G.W.; Kac, M.; Mazur, P., *J. math. phys.*, 6, 504, (1965)
- [6] Ullersma, P., *Physica*, 32, 27, (1966)
- [7] Dorfman, J.R., *An introduction to chaos in nonequilibrium statistical mechanics*, (1999), Cambridge University Press Cambridge · [Zbl 0973.82001](#)
- [8] Lewis, J.T.; Thomas, L.C., *How to make a heat Bath*, () · [Zbl 0326.60119](#)
- [9] Chandrasekhar, S., *Rev. mod. phys.*, 15, 1, (1943)
- [10] Nelson, E., *Dynamical theories of Brownian motion*, (1967), Princeton University Press Princeton · [Zbl 0165.58502](#)
- [11] Garbaczewski, P., *Physica A*, 285, 187, (2000)
- [12] Liboff, R.L., *Kinetic theory*, (1990), Prentice-Hall Englewood Cliffs, NJ · [Zbl 0119.45502](#)
- [13] Garbaczewski, P., *Phys. rev. E*, 59, 1498, (1999)
- [14] Klimontovich, Y.L., *Statistical theory of open systems*, (1995), Kluwer Dordrecht
- [15] Czopnik, R.; Garbaczewski, P., *Phys. rev. E*, 63, 021105, (2001)
- [16] Huang, K., *Statistical mechanics*, (1963), Wiley New York
- [17] Schuss, Z., *Theory and applications of stochastic differential equations*, (1980), Wiley New York · [Zbl 0439.60002](#)
- [18] Geilikman, B.T., *Zh. eksp. teor. fiz.*, 17, 839, (1947)
- [19] Guth, E., *Adv. chem. phys.*, 15, 363, (1969)
- [20] Balescu, R., *Statistical dynamics. matter out of equilibrium*, (1997), Imperial College Press London · [Zbl 0997.82505](#)
- [21] Garbaczewski, P., (), 455
- [22] Kolmogorov, A., *Ann. math.*, 35, 116, (1934)
- [23] Wentzell, A.D., *A course in the theory of stochastic processes*, (1981), McGraw-Hill New York · [Zbl 0502.60001](#)
- [24] Taylor, J.B., *Phys. rev. lett.*, 6, 262, (1961)
- [25] Kurşunoğlu, B., *Ann. phys. (NY)*, 17, 259, (1962)
- [26] Kaniadakis, G., *Physica A*, 307, 172, (2002)

- [27] Takabayasi, T., *Progr. theor. phys.*, 11, 341, (1954)
- [28] Lee, Hai-Woong, *Phys. rep.*, 259, 148, (1995)
- [29] Garbaczewski, P.; Kondrat, G.; Olkiewicz, R., *Phys. rev. E*, 55, 1997, (1401)
- [30] Baublitz, M., *Phys. rev. A*, 51, 1677, (1995)

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