THE EXISTENCE OF DYNAMICAL ATTRACTORS IN THERMOSTATS WITH NONLINEAR DISSIPATION

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We study the dynamics of various models of many particle systems in thermostats with nonlinear dissipation (in particular the Berendsen and the Nose-Hoover thermostat). Our numerical simulation in conjunction with the analytical methods indicate that on introducing even small nonlinear dissipation we drastically change the asymptotic behavior of the systems. The attractor regimes that are generated by the procedure result in non-physical distributions of energy with respect to various degrees of freedom.

The important point in that the characteristic times for the decent of the system on the attractor regimes grow linearly with the increase of the number of degrees of freedom [1]. Thus, we come to the conclusion that the use of even small nonlinear dissipation for keeping the total energy or temperature at prescribed level is generally incorrect, especially for long trajectories.

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1. Golo V.L., Shaitan K.V.//Biofizika. 2002. (Russian), in press.