

## Integrable dissipative dynamical systems: backgrounds, methods, and applications

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*Abstract:* We establish the integrability of some homogeneous (with respect to a part of variables) dynamical systems of odd (third and fifth) order. In the class of such systems, we extract a system on the tangent bundle of smooth manifolds. The force field is separated into the internal (conservative) force field and the external force field with alternating dissipation. The external force field is introduced by using a certain unimodular transformation and generalizes the cases studied by the author earlier. It is rather difficult to give a general definition of a dynamical system, but it can be done in some particular cases: certain coefficients in the system characterize the energy scattering in some domains and the energy pumping in other domains of the phase space. The latter leads to the loss of known first integrals (the laws of conservation) expressed in terms of smooth functions. However, as soon as attracting or repelling limit sets appear in the system, one has to forget about a complete list of even continuous first integrals in the whole phase space.

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