

Contribution Title: THE NONCLASSICAL APPROACH TO ANALYSIS OF
HAMILTONIAN AND CONSERVATIVE SYSTEMS

Authors: N. A. Magnitskii

Presenting author: Magnitskii N. A.

Affiliation: Professor, Head of Laboratory, Institute for Systems Ana-
lysis of RAS, Moscow, Russia,
mag@su29.ru

E-mail: mag@su29.ru

Invited speaker:

YRS seminar: NO

The new approach is offered for the analysis of solutions of complex perturbed conservative (in particular, Hamiltonian) systems. This approach implies the construction of an approximating extended two-parametrical dissipative system of the equations, whose stable solutions (attractors) are as much as exact approximations to solutions of the original conservative system. On the basis of the carried out numerical calculations for several three- and four-dimensional conservative systems and Hamiltonian systems with two and three degrees of freedom, it is shown, that in all these systems transition to chaos occurs not through destruction of two-dimensional or three-dimensional tori of unperturbed system, but, conversely, through a generation of complex two-dimensional tori around of cycles of extended dissipative system and through the infinite cascade of bifurcations of generations of new cycles and singular trajectories according to the Feigenbaum-Sharkovskii-Magnitskii (FSM) theory.

[1] Magnitskii N. A., Sidorov S.V. *New Methods for Chaotic Dynamics*. - Singapore: World Scientific, 2006, 363p.

[2] Magnitskii N. A. Universal theory of dynamical chaos in nonlinear dissipative systems of differential equations. - *Comm. Nonlin. Sci. Numer. Simul.*, 13, 2008, 416-433p.

[3] Magnitskii N. A. New approach to analysis of Hamiltonian and conservative systems. - *Differential equations*, 2008, 44, 12, 1682-1690.