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Complex dynamics in Hamiltonian-driven dissipative system

D.O. Lubchenko, A.V. Savin
Saratov State University, Saratov, Russia
avsavin@rambler.ru

We study the discrete system that approximates a billiard with oscillating boundaries. It consists of a dissipative 2D map affected by a conservative 2D map. We show that the variety of dynamic regimes including strange non-chaotic exist in this system as well as the multistability with the extreme number of coexisting attractors.

On an approximate formula for functionals with respect to stochastic Poisson measure

Anatoly Zherelo
Belarusian State University, Minsk, Belarus

The report proposes a formula for the approximate calculation of mathematical expectations of functionals with respect to a stochastic Poisson measure. The formula belongs to weak methods of approximating the values of functionals and is exact for third-order moments. Examples of application of the formula are given.

Optimizing 3D Ionosphere Reconstruction Algorithm Based on Modified Landweber Method for Enhanced Radiotomography Accuracy

Artemiev V.M., Naumov A.O., Khmarskiy P.A.
Institute of Applied Physics, Minsk, Belarus

The report addresses the problem of three-dimensional ionospheric reconstruction using data from global navigation satellite systems. We present a novel algorithm for 3D ionospheric reconstruction based on a modified Landweber method. Key features include setting relaxation parameters and initial values according to the Chapman equation and exponential distribution, smoothness constraints using a nine-point finite-difference approximation of the second-order Laplace operator, and weighting coefficients to account for constraints and initial values. The algorithm structure and operating principle are described. We developed a mathematical modeling framework to investigate ionospheric reconstruction algorithms, utilizing simulated total electron content measurements derived from a realistic ionospheric model. Results show reconstruction quality dependencies on the choice of ionospheric pierce point and weighting coefficients determining smoothness constraints and initial approximations. A methodology for optimizing the 3D reconstruction algorithm parameters, utilizing an ionospheric mathematical model and surrogate multi-parameter optimization is proposed. This approach significantly reduces algorithm tuning time and ensures finding the global extremum. The proposed method advances ionospheric tomography capabilities with potential applications in radio communications, navigation, and space weather monitoring, demonstrating improved accuracy in reconstructing ionospheric electron density distributions.

Geometric Models of Nonwandering Indecomposable Continua

Anna M. Khakhina[1], Dmitry Serow[2]
Peter the Great St.,Petersburg Polytechnic University, Saint-Petersburg Russia
National Centre for Dynamic System Research RAS, Gatchina, Russia
dimusum@yandex.ru

Recently, I have researched and then announced the topological classification of the Birkhoff curves and the nonwandering continua possessing Wada property. At the same time, I made a fundamental mistake by allowing the existence of more than the only fixed point belonging to the Birkhoff curve.