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Chapter 1 : Advances in Mathematical Physicsâ€” An Open Access Journal

Aims and Scope. Publishes original papers on all topics in which theoretical physics and mathematics interact with each other.

This is an open access article distributed under the Creative Commons Attribution License , which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. Twelve articles, containing the studies in chaos and synchronization, nonlinear evolution equations, and applied dynamical systems, are accepted after strict review process. A new Guest Editor, Christos Volos, from Aristotle University of Thessaloniki, was invited to serve in the areas of chaotic systems and synchronization. We believe these articles, including their bibliographic resources, will substantially improve the quality of our special issue and show wide interest to the readers in nonlinear communities. The experiment that boosted the consideration of chaotic behavior was due to Lorenz [1]. In , working in a simplified model of atmospheric transfer with three nonlinear differential equations, he observed numerically that when making very small changes in the initial conditions he got a huge effect on their solutions. For many years the property of chaos became undesirable, since it reduced the predictability of the chaotic system over long time periods. However, the scientific community was gradually becoming aware of this type of dynamical behavior. Some experiments, where abnormal results had been previously explained in terms of experimental error or additional noise, were evaluated for an explanation in terms of chaos. Since then, a huge number of studies in chaotic phenomena and dynamical systems that produce chaos have been published. The dynamics of a system displays chaotic behavior; when it never repeats itself, and even if initial conditions are correlated by proximity, the corresponding trajectories quickly become uncorrelated. As such, the possibility of two or more chaotic systems oscillating in a coherent and synchronized way seems to be not an obvious phenomenon. However, there are sets of coupled chaotic oscillators in which the attractive effect of a sufficiently strong coupling can counterbalance the trend of the trajectories to diverge. As a result, it is possible to reach full synchronization in chaotic systems since they are coupled by a suitable dissipative coupling. Chaos synchronization began in the mids about coupling of discrete and continuous identical systems, evolving from different initial conditions [4 â€” 8]. These works immediately received a great deal of attention from the scientific community and opened up a wide range of applications outside the traditional scope of chaos and nonlinear dynamics research. Since then, various synchronization methods and several new concepts necessary for analyzing synchronization have been developed. In this special issue, three articles are dedicated to the investigation of chaotic systems and their synchronization. Wang, some sufficient conditions, which are valid for the stability check of fractional-order nonlinear systems, are presented. Based on the aforementioned conditions, the synchronization of two fractional-order chaotic systems is investigated. The asymptotical stability of the synchronization error can be guaranteed by a proposed fractional-order sliding mode controller. The numerical examples show the feasibility of the proposed method. Liu, an adaptive fuzzy synchronization controller is designed for a class of fractional-order neural networks subjected to backlash-like hysteresis input. The stability of the closed-loop system, under the influence of the adaptive fuzzy controller, is rigorously analyzed based on the fractional Lyapunov stability criterion. Furthermore, fractional adaptation laws are established to update the fuzzy parameters. The simulation examples indicate the effectiveness and the robustness of the proposed control method. The system is shown to be chaotic and has an adjustable amplitude variable, which is suitable for practical uses. Circuit design of such a system has been realized without any multiplier, and experimental measurements have been reported. In addition, an adaptive control has been applied to reach the synchronization of the system. Nonlinear evolution equations NEEs play important roles in simulating the real dynamical behaviors that appear in various scientific and engineering fields. Analysis of the NEEs, especially for finding their solutions, is one of the main tasks in nonlinear communities. For integrable NEEs, there exist several effective methods, such as the inverse scattering transformation and the Hirota method, in deriving certain types of localized wave solutions, e. For nonintegrable NEEs, multiple tools are employed to analyze their properties, among which the numerical methods are becoming powerful with the rapid development of computational resources. In this special issue, six articles are included to demonstrate advances relating to the NEEs, from both of the analytic and numerical aspects. Hyperbolic function solution, trigonometric function solution, and rational solution with general parameters are obtained. The solitary wave solutions and new traveling wave solutions can be derived when special values of the parameters are taken. Numerical error analysis in both cases of nonlinearity is carried out for various source functions supporting the advantage of the method. Li, the Galerkin method is applied to establish the approximate solutions for the one-dimension Klein-Gordon-Zakharov KGZ equations, and the local classical solutions are obtained. The authors also derive the existence and uniqueness of the global classical solutions of the KGZ equations by integral estimates. The bottom topography and bottom friction are included to the equation of Riemann invariants as the source term. Numerical experiments demonstrate the good performance of the scheme. In addition, numerical tests with reflective boundary conditions are carried out by CIP-MOC with large time step size, and good results are obtained as well. They use an approach which does not involve the conventional Lyapunov-Krasovskii functional, and propose new conditions such that all the state trajectories of the system converge asymptotically within a ball. This work introduced the convergence ball and error estimate of the modified secant method using a technique based on Fibonacci series. In this special issue, we also include three articles focusing on application of the nonlinear dynamical systems in diffusion behavior, fluid, and solid mechanics. Kawaguchi, the motion of a spot under the influence of chemotaxis is considered. For this reason, a two-component reaction diffusion system, with a global coupling term and a Keller Segel type chemotaxis term, is presented. The existence of an upper limit for the velocity and a critical intensity for the chemotaxis, over which there is no circular motion, is proved. As a consequence the chemotaxis suppresses the range of velocity for the circular motion. This braking effect on velocity originates from the refractory period behind the rear interface of the spot and the negative chemotactic velocity. They show that their method can not only reduce simulation error to get a good inversion, but also enable larger time step size to decrease computation time and improve the calculation efficiency. By introducing potential functions, the closed-form expressions for the displacement and the stress of the soil surrounding the tank are obtained. In addition, the effects of relative physical properties and geometrical parameters on the dynamics of the system are discussed. Conflicts of Interest The authors declare that there are no conflicts of interest regarding the publication of this article. Acknowledgments We would like to express our sincere thanks to all the authors and reviewers for their contributions to this special issue.

Chapter 2 : Timeline of fundamental physics discoveries - Wikipedia

Advances in Theoretical & Computational Physics is an open access journal which provides a rapid, resourceful and productive proceedings publication service. Physics is a basic stream of science that involves study of nature and properties of different states of matter.

Chapter 3 : Theoretical and Computational Advances in Nonlinear Dynamical Systems

The papers presented at that meeting are published here, providing an overview of recent progress in theoretical physics, covering super-string theories, chaos, high Tc superconductivity and biomolecules.

Chapter 4 : Advanced Studies in Theoretical Physics

The physics of supernovae and the equation of state of dense nuclear matter, G E Brown. Physics in proteins, H Frauenfelder. Quasiparticle method in nuclear physics, A B Migdal.

Chapter 5 : Advances in Theoretical and Mathematical Physics

The conference "Advances in Theoretical Physics", held in Chernogolovka, Russia, is devoted to Lev Landau's year *anniversary. It was organized by the Landau Institute for Theoretical Physics, which was established by Landau's pupils who carried on his traditions.*

Chapter 6 : Reports on Mathematical Physics - Journal - Elsevier

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Chapter 7 : Advances in Theoretical and Mathematical Physics - Wikipedia

advances in theoretical physics can be as a result of improved measurements. (telescopes, microscopes, particle accelerators, etc) ask in about 90 years time:).

Chapter 8 : Publication Information

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