CHAOS 2018
Book of Abstracts

11\textsuperscript{th} Chaotic Modeling and Simulation International Conference

\textit{Editor}
Christos H. Skiadas

Rome, Italy, 5-8 June 2018
Imprint
Book of Abstracts of the 11th Chaotic Modeling and Simulation International Conference (Rome, Italy: 5-8 June, 2018)
Published by: ISAST: International Society for the Advancement of Science and Technology.
Editor: Christos H Skiadas


© Copyright 2018 by ISAST: International Society for the Advancement of Science and Technology.

All rights reserved. No part of this publication may be reproduced, stored, retrieved or transmitted, in any form or by any means, without the written permission of the publisher, nor be otherwise circulated in any form of binding or cover.
governing for a coupled differential nonlinear system, and in several previous work we show chaos in the fluid. This work is, in some sense, a generalization of some previous results on standard (Newtonian) fluids obtained by A. Rodríguez-Bernal and E.S. Van Vleck [1], when we consider a viscoelastic fluid

**Keywords:** Thermosyphon, Viscoelastic fluid, Asymptotic behaviour.

**References:**

---

**Turbulent Prandtl Number in Two Dimensions**

Eva Jurcisinová¹, Marian Jurcisin¹, Richard Remecký¹²

¹Institute of Experimental Physics, Slovak Academy of Sciences, Slovakia,
²Bogoliubov Laboratory of Theoretical Physics, Joint Institute for Nuclear Research, Dubna, Russian Federation

Using the field theoretic renormalization group technique, the two-dimensional turbulent Prandtl number of passively advected scalar field in turbulent environment driven by the stochastic Navier-Stokes equation is calculated in the two-loop approximation

**Keywords:** fully developed turbulence, stochastic dynamics, renormalization group, quantum field theory, Navier-Stokes equation, Prandtl number, double expansion, scalar field

---

**Nonlinear Dissipative Soliton Dynamics**

Vladimir L. Kalashnikov

*Institute of Photonics, Vienna University of Technology, Austria*

Nonlinear coupling between incommensurable temporal scales can result in excitation of the manifold of the new degrees of freedom that corresponds to an appearance of new frequency components with distorted mutual phase relations. As a result, a femtosecond pulse (dissipative soliton, DS) losses its coherence, and its dynamics becomes chaotic and even turbulent. We propose the innovative method based on the Weyl-Wigner-Moyal representation of the stochastic nonlinear dynamics. The advantages of this approach are i) possibility of numerical simulation of quantum-mechanical nonlinear equations in the Heisenberg’s operator representation, and ii) direct taking into account of the stochastic properties without a statistic gathering. To study the issue of chaotization of DS dynamics, we developed the statistical mechanics and thermodynamic approaches to critical phenomena and turbulence. These methods utilize the representation of DS as a “complex” (“blocks assembly” like structures in a ferromagnet) driven by a multiscale
hierarchy of nearest-neighbor and long-range couplings. Such approach can have far-reaching consequences for the general theory of coherent (and semi-coherent) dissipative structures.

**Keywords:** Dissipative solitons, Coherent and turbulent dissipative structures, Weyl-Wigner-Moyal representation of stochastic dynamics.

**Multiple Correlation Analysis for Chaotic Time Series**

*Miraç Kamişlioğlu*

*Uskudar University, Vocational School of Health Service, Nuclear Technology and Radiation Safety Dept, 346721, İstanbul, Türkiye.*

Chaos analysis methods are utilized to show the nonlinearity state of the data in the study. 222Rn measurements were performed statistical evaluation. Multiple correlation analysis were also performed on the non-parametric tests for the series, and statistically analysis were performed to determine the power of the variables. The results between real values and the predicted value of the data were obtained as statistical. The accuracy of the results was confirmed with statistical analyses. This work, a new aspect was obtained for explaining the non-linear characteristic of 222Rn concentrations from soil.

**Keywords:** Chaotic time series, multiple statistical analysis, corelation analysis, 222Rn data, prediction.

**Detrended Fluctuation Analysis for Variations of Radon in soil: Lesvos Island (Greece)**

*Miraç Kamişlioğlu, Feride Kulali*

*Uskudar University, Vocational School of Health Service, Nuclear Technology and Radiation Safety Dept, Turkey*

Many studies have been performed to understand the correlations between earthquakes and the other geological parameters. 222Rn is one of the most common parameters which is used for the analysis of this correlations. Data analysis methods has a critical important for complex dynamical system such as earthquakes. Scale analyses technique, DFA, has similar exponents with RMS (Root Mean Square) and Hurst. This is a method for prediction of long-range power-law correlation exponents. As a product of normal distribution for the monofractal time series where the variance is obtained by the second order statistical moment alone, multifractal time series have both excessively large and small fluctuation. In the current study, DFA analysis was applied for 222Rn data which was collected from Lesvos Island, Greece. The results of Detrended Fluctuation Analysis have a strong correlation for each 222Rn time series.