

## *Editorial*

# **Dynamics and Control in Sciences and Engineering**

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Received 19 August 2007; Accepted 19 August 2007

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The aim of this special issue is to present discussions of some recent developments in the area of dynamics and control, in all branches of science and engineering.

The subject of dynamics and control systems is wonderfully broad and it has important applications in fields ranging from several engineering branches, physics, and computer science to the life sciences, sociology, and finance.

So, this special issue of MPE is designed to present the state-of-the-art research and the latest theoretical, numerical, and practical achievements to contribute to the advancement of this field, in a significant way.

This special issue involves 19 original papers, selected by the editor, related to the various researches themes on dynamics and control, in order to present recent results on the mentioned fields.

These papers are related to various subjects: mechanical (modeling, dynamics, robotics, structures, chaos); electrical (telecommunications), aerospace science, biological (modeling), fluids and control processes (optimization).

This special issue on Dynamics and Control in Sciences and Engineering papers is organized as follows:

*Concerning chaos, the 4 papers are:*

Successive Bifurcation Conditions of a Lorenz-Type Equation for the Fluid Convection Due to the Transient Thermal Field, Xiaoling He.

## 2 Mathematical Problems in Engineering

Patrol Mobile Robots and Chaotic Trajectories, Luiz S. Martins-Filho and Elbert E. N. Macau.

Inductorless Chua's Circuit: Experimental Time Series Analysis, R. M. Rubinger, A. W. M. Nascimento, L. F. Mello, C. P. L. Rubinger, N. Manzanares Filho, and H. A. Albuquerque.

Chaos Synchronization Criteria and Costs of Sinusoidally Coupled Horizontal Platform Systems, Jianping Cai, Xiaofeng Wu, and Shuhui Chen.

*Concerning control and identification, the 6 papers are:*

Stabilizability and Motion Tracking Conditions for Mechanical Nonholonomic Control Systems, Elżbieta Jarzębowska.

Stabilization and Observability of a Rotating Timoshenko Beam Model, Alexander Zuyev and Oliver Sawodny.

Numerical and Analytical Study of Optimal Low-Thrust Limited-Power Transfers between Close Circular Coplanar Orbits, Sandro da Silva Fernandes and Wander Almodovar Golfetto.

Fault Detection and Control of Process Systems, Vu Trieu Minh, Nitin Afzulpurkar, and W. M. Wan Muhamad.

Joint Dynamics Modeling and Parameter Identification for Space Robot Applications, Adenilson R. da Silva, Luiz C. Gadelha de Souza, and Bernd Schäfer.

Quadratic Stabilization of LPV System by an LTI Controller Based on ILMI Algorithm, Wei Xie.

*Concerning dynamics, the 3 papers are:*

Modal Formulation of Segmented Euler-Bernoulli Beams, Rosemaira Dalcin Copetti, Julio C. R. Claeysen, and Teresa Tsukazan.

Asymptotic Solution of the Theory of Shells Boundary Value Problem, I. V. Andrianov and J. Awrejcewicz.

Dynamic Stationary Response of Reinforced Plates by the Boundary Element Method, Luiz Carlos Facundo Sanches, Euclides Mesquita, Renato Pavanello, and Leandro Palermo Jr.

*Concerning dynamics and control applications, the 2 papers are:*

Simple Orbit Determination Using GPS Based on a Least-Squares Algorithm Employing Sequential Givens Rotations, Rodolpho Vilhena de Moraes, Aurea Aparecida da Silva, and Helio Koiti Kuga.

Evaluation of Tropospheric and Ionospheric Effects on the Geographic Localization of Data Collection Platforms, C. C. Celestino, C. T. Sousa, W. Yamaguti, and H. K. Kuga.

*Concerning turbulence, the 2 papers are:*

Incompressible Turbulent Flow Simulation Using the  $\kappa$ - $\varepsilon$  Model and Upwind Schemes, V. G. Ferreira, A. C. Brandi, F. A. Kurokawa, P. Seleglim Jr., A. Castelo, and J. A. Cuminato.

Dynamical Simulation and Statistical Analysis of Velocity Fluctuations of a Turbulent Flow behind a Cube, T. F. Oliveira, R. B. Miserda, and F. R. Cunha.

*Concerning Biological applications, the paper is:*

A Stochastic Model for the HIV/AIDS Dynamic Evolution, Giuseppe Di Biase, Guglielmo D'Amico, Arturo Di Girolamo, Jacques Janssen, Stefano Iacobelli, Nicola Tinari, and Raimondo Manca.

*Concerning telecommunications, the paper is:*

Models for Master-Slave Clock Distribution Networks with Third- Order Phase-Locked Loops, José Roberto Castilho Piqueira and Marcela de Carvalho Freschi.

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## Special Issue on Modeling Experimental Nonlinear Dynamics and Chaotic Scenarios

### Call for Papers

Thinking about nonlinearity in engineering areas, up to the 70s, was focused on intentionally built nonlinear parts in order to improve the operational characteristics of a device or system. Keying, saturation, hysteretic phenomena, and dead zones were added to existing devices increasing their behavior diversity and precision. In this context, an intrinsic nonlinearity was treated just as a linear approximation, around equilibrium points.

Inspired on the rediscovering of the richness of nonlinear and chaotic phenomena, engineers started using analytical tools from “Qualitative Theory of Differential Equations,” allowing more precise analysis and synthesis, in order to produce new vital products and services. Bifurcation theory, dynamical systems and chaos started to be part of the mandatory set of tools for design engineers.

This proposed special edition of the *Mathematical Problems in Engineering* aims to provide a picture of the importance of the bifurcation theory, relating it with nonlinear and chaotic dynamics for natural and engineered systems. Ideas of how this dynamics can be captured through precisely tailored real and numerical experiments and understanding by the combination of specific tools that associate dynamical system theory and geometric tools in a very clever, sophisticated, and at the same time simple and unique analytical environment are the subject of this issue, allowing new methods to design high-precision devices and equipment.

Authors should follow the Mathematical Problems in Engineering manuscript format described at <http://www.hindawi.com/journals/mpe/>. Prospective authors should submit an electronic copy of their complete manuscript through the journal Manuscript Tracking System at <http://mts.hindawi.com/> according to the following timetable:

|                        |                  |
|------------------------|------------------|
| Manuscript Due         | February 1, 2009 |
| First Round of Reviews | May 1, 2009      |
| Publication Date       | August 1, 2009   |

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