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Instrumentation Measurement Electronics Circuits & Systems

Proceedings of the 8th WSEAS Int. Conf. on
INSTRUMENTATION, MEASUREMENT, CIRCUITS and SYSTEMS (IMCAS'09)

Hangzhou, China, May 20-22, 2009

Electrical and Computer Engineering Series
A Series of Reference Books and Textbooks

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Preface

This year the 8th WSEAS International Conference on Instrumentation, Measurement, Circuits and Systems (IMCAS'09) was held in Hangzhou, China. The Conference remains faithful to its original idea of providing a platform to discuss instrumentation, measurement, electrical and electronic measurement, data and knowledge acquisition, measurement in complex systems, real-time systems etc. with participants from all over the world, both from academia and from industry.

Its success is reflected in the papers received, with participants coming from several countries, allowing a real multinational multicultural exchange of experiences and ideas.

The accepted papers of this conference are published in this Book that will be indexed by ISI. Please, check it: www.worldses.org/indexes as well as in the CD-ROM Proceedings. They will be also available in the E-Library of the WSEAS. The best papers will be also promoted in many Journals for further evaluation.

A Conference such as this can only succeed as a team effort, so the Editors want to thank the International Scientific Committee and the Reviewers for their excellent work in reviewing the papers as well as their invaluable input and advice.

The Editors

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Plenary Lecture 1

The Improvement of Performances in Automatic Dimensional Inspection for Bearing Production - An Important Way to Quality Assurance in Mechanical Engineering

Professor Luciana Cristea
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Abstract: The new idea of products' quality insurance as well the control effectiveness lay down the necessity of a strong interaction and integration among different branches of engineering. The structure effectiveness for processing and control is worldwide a top concern.
The dimensional inspection automatisation is one of the main requirements for the technological improvements of the manufacturing systems in all industrial fields. The bearing production has to undertake a continuous quality improvement due to its major economic involvement; the consequence consists in high performances in the quality ensuring.
As an integrated field, the control automatic devices include the classic mechanic engineering, electronics and computer field in designing, control and evaluation for these systems.
The bearing industry achieved in our country special results in the inspection automatic devices field. The currently used automatic drive systems are manufactured for concrete service and are equipped with elementary components.
Through the modulating of the component subassemblies and the using of microelectronic systems with the worldwide highest performances for control and drive and based on a detailed analysis of the automate control systems, this paper emphasizes some important items with reference to the quality assurance in Bearing Industry.
In this paper are being approached a few aspects concerning the dynamic behaviour of automatic systems for bearings inspection with the aim of achieving the best structures from the efficiency and quality assurance point of view.
The analysis of the results obtained during the optimisation process lead to the elaboration of new possibilities of assuring the structures of optimum automatisation from the efficiency, quality and energy consumption point of view, for different types of bearings.

Brief Biography of the Speaker: Prof. Dr. Eng. Luciana CRISTEA is professor in the Department of Precision Mechanics and Mechatronics from "Transilvania" University of Brasov-Romania, coordinator of the Precision Mechanics Specialization, coordinator of the research department "High-precision Mechanical Products and Mechatronic Systems" from "Transilvania" University of Brasov, coordinator of the Conceiving Division of Products Testing-Assessment and Quality Guarantee (CATEPAC) – SAVAT Platform. She has been involved in the research activity since 1988 (as a scientific researcher at ICSITROA Brasov and as a member of the teaching and researching staff at the "Transilvania" University Brasov). She participated in 32 research contracts, in 17 as a coordinator, from 1990 up to date. She published 9 books in consecrated publishing houses (1 book in an international publishing house), 12 university courses and manuals, 148 scientific papers in the field of Precision Mechanics and Mecahtronics and is the author of 3 inventor patents. She is PhD coordinator since 2004.

Since 2008, Professor Luciana CRISTEA is the Head of the Department of Precision Mechanics and Mechatronics from "Transilvania" University of Brasov-Romania;

Domains of interest: Precision mechanics and mechatronics Control and serving automat systems, Technologies and systems of dimensional inspection and serving; Optimisation of supplying, transportation, and dosing systems utilized in control automates fabrication, Structural improvement of automatic Microsystems, Mechanical engineering.
Former approached research domains: Fabrication, forming operations, and industrial control using robots and automatic instalations (1990-92); Research and simulation of supplying, dosing and transportation systems utilised in industrial automatisations for optimisation (1994-96); Structural improvement and modernizing of automatic dimensional control systems designated to re-technologisation and assembly organs production quality guarantee (1988-2002); Modular conceiving of automatic dimensional control systems for control equipment optimisation and re-technologisation, and products quality guarantee (2002-2006); Conceiving products testing-assessment and quality guarantee (2005-2006); Miniatural robotic system with reconfiguration and self-multiplication abilities (2006-2008).
She is member of the Romanian General Association of Engineers (AGIR), funding Member of the Romanian Association of Precision Mechanics and Optics (AMFOR) and Funding Member of the Romanian Society of Mechatronics (SROMECA).

Plenary Lecture 2

The Statistical Behavior of the Spread of Infection by the Contact Systems

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Abstract: We consider a contact system that describes the behavior of a process which has been used to model the spread of a disease or a biological population. The collection of individuals that may be infected at any given time is taken to be the set of vertices of a connected, undirected graph. For such a graph, the degree of a vertex is the number of vertices that are connected to by an edge. In the present paper, we consider the contact model on the dimensional integer lattice (in which the degree of each vertex is). In -dimensional space, one point is stood by one individual. The virus infects one proximate individual at a rate equal to, where is an intensity of the contact model. And the individual infected recovers at rate one. Speaking concretely, contact model is a continuous time Markov process in the configuration. At some random time, one individual at the point is deemed to be infected when and the infected individual recovers at rate one; if , the individual at the point is healthy and will be infected at a rate equal to times the number of the infected neighbors. In this paper, applying the theory of the contact system, one kind of spread of infection model (which defined from the contact model) is analyzed and estimated by the theory of stochastic analysis, including the stopping time method. Further, we show the asymptotic behavior of probability distributions which describe the fluctuations for the spread of infection.

Brief Biography of the Speaker: Professor and Dr. Jun Wang is a full professor at College of Science in Beijing Jiaotong University, P.R. China. He is also the Director of Institute of Financial Mathematics and Financial Engineering. Professor Wang received his Ph.D. from the Kobe University of Japan, and continued his research work in Kobe University as a researcher supported by Japan Society for the Promotion of Science. Recently, his research work is supported in part by the National Natural Science Foundation of China Grant No. 70471001 and No. 70771006, Ministry of Education of China Grant No. 406 (2003), BJTU Foundation No. 2006XM044.
Professor Wang has wide research interests, which include: Large Scale Interacting Systems, Stochastic Systems, Dynamical Systems, Statistical Physics Systems (Ising Dynamical Systems, Percolation Theory, Voter Systems and Contact Systems, Widom-Rowlinson Model, etc.), Non-linear Systems, Stochastic Control, Artificial Intelligence, Modeling and Computer Simulation, Ergodic Theory, Probability Theory and Statistics, Financial Mathematics and Financial Engineering (Risk Management and Risk Analysis, Marketing, Stock Fluctuations Analysis, Option, Contingent Claims, Valuation and Hedging, etc.).

Plenary Lecture 3

A Numerical Approach for Determining Elastic Material Properties from Experimental Data

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Abstract: The elastic properties of solids play a fundamental role in both scientific and technological fields. Their measurement provides information regarding the forces exchanged among the atoms or ions that compose a solid, so helping to characterize the nature of the links. It also allows us to describe the mechanical behaviour of the material which is fundamental for the structural design and experimental stress analysis. Moreover, the possibility of measuring the elastic constants of materials, fast and accurately, during the manufacturing cycle of a product could help with quality control. As a result there are many methodologies for the elastic characterization of materials. To day there is still great interest in this subject especially in the context of the development of the new and more complex materials for which the classic methods of characterization appear time-consuming, expensive and, in some cases, unsuitable.
The lecture deals with a promising recent methodology for the characterization of isotropic or anisotropic materials. The elastic constants are identified through a process that minimizes the difference between the dynamic or static response of the real structure (measured response) and the response of the same structure predicted from a numerical model (virtual response). This method updates iteratively the values of the elastic constants of material in the model, until the virtual response (the first natural frequencies in the dynamic approach or the field of the superficial displacements in static approach) approximates as closely as possible the real response measured by means of experimental observations. The values of the constants used in the last iteration are the elastic properties of the material. The identification of all the elastic constants can take place simultaneously, with a single experiment and without damaging the specimen.

Brief Biography of the Speaker: Leonardo Pagnotta was born in Pizzo (Vibo Valentia, Italy), May 16, 1957. He graduated in Mechanical Engineering in 1984 at the University of Calabria (Arcavacata di Rende, Cosenza, Italy) and he received his PhD in Mechanics of Materials from the University of Pisa in 1990. He was appointed researcher in Experimental Mechanics in 1994, associate professor of Machine Design in Mechanical Engineering in 2000 and full professor in 2006. At present he is professor at the Faculty of Engineering of University of Calabria for which he has held courses in Machine Design, Mechanics of Materials, Mechanics of Composite Materials, Theory of measurement, Instrumentation for mechanical and thermal measurements since 1990. From 2004, he is also holding a course of Biomedical Instrumentation at University “Magna Grecia” of Catanzaro.
His research activities have been addressed to numerical methodologies for stress analysis, reliability design of ceramic material component, structural optimization of composite material component, and methods of experimental mechanics (strain gages, holographic and speckle interferometry and integrated photoelasticity) applied to residual stress measurement in metals and optical fiber, elastic properties measurement of isotropic and anisotropic material, fracture mechanics, and non-destructive testing. Recently, he is developing numerical-experimental methodologies for the elastic characterization of anisotropic materials by vibrational and static techniques. Professor Pagnotta has published about 80 scientific research papers.

Plenary Lecture 4

Implementation of a Lidar System and its Usage in Characterization of Atmospheric Column

Professor Hamed Parsiani
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Abstract: Light Detection and Ranging (LIDAR) is a recent remote sensing system which has been gradually expanding as a network among the countries actively concerned about the atmospheric contaminants, earth radiation budget, rain variations, clean air index, etc. In this work, the design of a typical Lidar, ground or satellite based system for three or more wavelengths is explained. Essential parameters for the atmospheric characterizations such as Aerosol Optical Depth (AOD), Angstrom coefficient, Single/Multiple scattering Albedo, and Aerosol Effective Radius (AEF) are explored and the required mathematics and the needed wavelengths for their determination are presented. These parameters have been calculated and plotted based on three Lidar system wavelengths of 355, 532, and 1064 nms and the data obtained from Lidars in New York and Puerto Rico. The relationship between the essential parameters presented by the plots and the atmospheric behavior is explained.

Brief Biography of the Speaker: Hamed Parsiani is a full professor of Electrical & Computer Engineering at the University of Puerto Rico at Mayaguez (UPRM). He is currently directing the development of the first three wavelengths Lidar System laboratory for the advanced atmospheric research in Puerto Rico, and the Caribbean region. He is the research director of the UPRM NOAA-CREST grant which is now in its seventh year, covering research in Tropospheric, Hydroclimate, and Coastal Remote Sensing areas. He is presently a UPRM-PI of grant sponsored by NSF-FUSION company in the area of Aquifer Delineation using Ground Penetrating Radar. His interests are in remote sensing using radar and lidar, image processing, image compression, soil type, soil moisture, and aquifer detection using ground penetrating radar.
His earlier research grants were sponsored by GSSI Inc. (PI), NASA-Tropical Research Center (Co-PI), NSF-PRECISE, NASA-PaSCOR as research collaborator. He contributed in the development of JPEG compression algorithm during his research work with Bell Communications Research (BELCOR), and Global Positioning System (GPS), a NASA grant. He was the co-organizer and co-chair of two NOAA-CREST Technical Symposiums (2006 & 2008), the chair of the International Symposium on Intelligent Systems in Communications (SISCAP-94) held at UPRM. He has served on several conferences paper review boards, and has over 50 publications in journals and proceedings.
He is an alumnus of the Oregon State University (BS EE & Math), and Texas A&M University (MEE, PhD in ECE), and a member of Eta Kappa Nu honor society, and IEEE.

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