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Recent Researches in Applications of Electrical and Computer Engineering

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Plenary Lecture 1

Mathematically Modelled Process of Resonant Absorption of Environmental Xenobiotics Harmonic Oscillation by Linear Structures

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Abstract: The study of any system, including biological systems, usually entails an analysis of inputs and outputs, and system behaviour can be assessed on basis of mathematical modelling and simulation. For an environmental xenobiotic source with an assumed harmonic behaviour, the xenobiotic concentration evolution within a biological system could be determined, assuming an analogy with a linear structure characterized by xenobiotic compounds of both dissipating and accumulating types. One could hope to show that a mathematical model described by a differential equation of order two with concentrated parameters could be accepted for a complex process of an environmental xenobiotic absorption by a linear structure. In line with this idea, one could define a hypothetical situation in which, from an environmental xenobiotic source with harmonic behaviour, the xenobiotic is absorbed by the biologic organism modelled as a system with a linear structure. The simulation diagram for the spatial vector of concentration, as resultant oscillation wave depicting the resonant absorption process of the environmental xenobiotic has been determined on basis of MATLAB software with SIMULINK and SimPowerSystems extensions. The results determine the variation in time of the spatial vector of concentration as periodical, with the wave shape determined by taking into consideration a modulation of the main excitation harmonic provided by the xenobiotic, and the resulting high frequency modulating signal on the basis of elements specific to a xenobiotic absorption circuit. Through consideration of a hypothetic simulation diagram for the spatial vector of xenobiotic concentration in a biological system, this study aims to demonstrate the need for joint efforts by researchers in electrical and environmental engineering, medicine and computing for enhancing knowledge of the impacts of environmental xenobiotics on humans and other life forms.

Brief Biography of the Speaker:
Cornelia Aida Bulucea is currently an Associate Professor in Electrotechnics, Electrical Machines and Environment Electrical Equipments in the Faculty of Electrical Engineering, University of Craiova, Romania. She is graduate from the Faculty of Electrical Engineering Craiova and she received the Ph.D degree from Bucharest Polytechnic Institute. In Publishing House she is author of four books in electrical engineering area. Research work is focused on improved solutions for electrical networks on basis of new electric equipments and environmental impact of energy and electric transportation systems. She has extensive experience in both experimental and theoretical research work, certified by over 70 journal and conference research papers and 15 research projects from industry. She has held in the Association for Environment Protection OLTENIA and she is a regular invited keynote lecture for environmental engineering symposia organized by Chamber of Commerce and Industry OLTENIA. Due to WSEAS recognition as huge scientific Forum she participated in seven WSEAS International Conferences, presenting papers and chairing sessions. She was Plenary Lecturer in the 9th WSEAS/IASME International Conference on ELECTRIC POWER SYSTEMS, HIGH VOLTAGES, ELECTRIC MACHINES (POWER'09), held by the University of Genova, Genova, Italy, October 17-19, 2009, in the 4th IASME/WSEAS International Conference on ENERGY&ENVIRONMENT (EE'09),), held by the University of Cambridge, Cambridge UK, February 24-26, 2009 and in the 8th WSEAS International Conference on POWER SYSTEMS (PS'08), held by the University of Cantabria, Santander, Spain, September 23-25, 2008. She is very proud by her over 30 papers published in the WSEAS Conferences Books and in the WSEAS TRANSACTIONS ON ENVIRONMENT AND DEVELOPMENT, WSEAS TRANSACTIONS ON CIRCUITS AND SYSTEMS and WSEAS TRANSACTIONS ON ADVANCES IN ENGINEERING EDUCATION.

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Plenary Lecture 2

Computer Analysis of a One-Piece Elastic Coupling

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"Dunarea de Jos" University from Galati
ROMANIA
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Abstract: The paper presents a new kind of one piece compensatory coupling which function principle puts it out from all the known categories.
It is also presented the static forces state in the active zone of the coupling.
In order to get the up mentioned aim, it is used the finite element programme (F.E.P.), which determines the characteristic dimensions of the coupling too.

Brief Biography of the Speaker:
I graduated in 1984, Faculty of Machines Construction Technologies and then I worked for 6 years at PROMEX Braila (manufacturer of excavators).
Since 1990 I am working at the "Dunarea de Jos" University from Galati – ROMANIA and now I am Associate Professor.
I also worked in construction as a major shareholder in several companies in 2000-2007 period.
As a teacher, I have guided many graduates who are now valued at their workplace.

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Plenary Lecture 3

Smart Prosthetic Hand Technology at Idaho State University

Professor D. Subbaram Naidu, PhD, PE, Fellow IEEE
Measurement and Control Engineering Research Center
Idaho State University, USA
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Abstract: Over 1.2 million people in America have missing limbs resulting from combat and non-combat operations. The availability of artificial limbs will help these people to lead a better normal life. The United States (US) Department of Defense embarked on a research program to "fund prosthetics research" to revolutionalize upper-body prosthetics and to develop artificial arms that will "feel, look and perform" like a real arm guided by the central nervous system.
The overall goal of the research on Smart Prosthetic Hand Technology that has been going on at Idaho State University is to develop a smart prosthetic hand using intelligent strategies for electromyographic (EMG) signal extraction, analysis, identification, kinematic synthesis, and embedded hierarchical real-time systems and control by fusion of soft computing and hard computing techniques. A novel cellular in vitro model is developed to address putative problems of cell signaling and biocompatibility. The identification algorithm using a new sensor array, and a hybrid estimation algorithm are investigated and different categories of amputation level are simulated. Strategies on grasping and manipulation involving human-robot interaction are developed to complement the EMG signals. The fusion of soft and hard control synergetic strategy alleviates the present problems associated with prosthetic devices. Investigations into the issues of the inflammatory responses of cells/tissues in response to an artificial implant and the interference with signaling of the artificial implant, the design of our in-vitro model ultimately improve the design and construct a functional and biocompatible artificial limb. The research includes both simulation and experimentation.

Brief Biography of the Speaker:
Desineni "Subbaram" Naidu received MTech and PhD degrees in Electrical Engineering (Control Systems Engineering), from Indian Institute of Technology (IIT), Kharagpur. Dr. Naidu taught and/or conducted research at IIT; Guidance and Control Division at NASA Langley Research Center; Old Domain University; Center of Excellence in Advanced Flight Research at United States (US) Air Force Research Laboratory; Center of Excellence for Ships and Ocean Structures at Norwegian University of Science and Technology; Measurement and Control Laboratory at Swiss Federal Institute of Technology; Nantong University (China); the University of Western Australia in Perth, Center for Industrial and Applied Mathematics at University of South Australia in Adelaide; Center for Applied and Interdisciplinary Mathematics at East China Normal University (Shanghai, China). Since 1990, Professor Naidu has been with Idaho State University, where he is Director of School of Engineering and Director of Measurement and Control Engineering Research Center. Professor Naidu received twice the Senior National Research Council Associateship award from the US National Academy of Sciences, and is an elected Fellow of the Institute of Electrical and Electronic Engineers (IEEE) and an elected Fellow of the World Innovation Foundation, UK. He has over 200 journal and conference publications including 6 books. He has been on the editorial boards of several journals including the IEEE Transactions on Automatic Control and Optimal Control: Applications and Methods.

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