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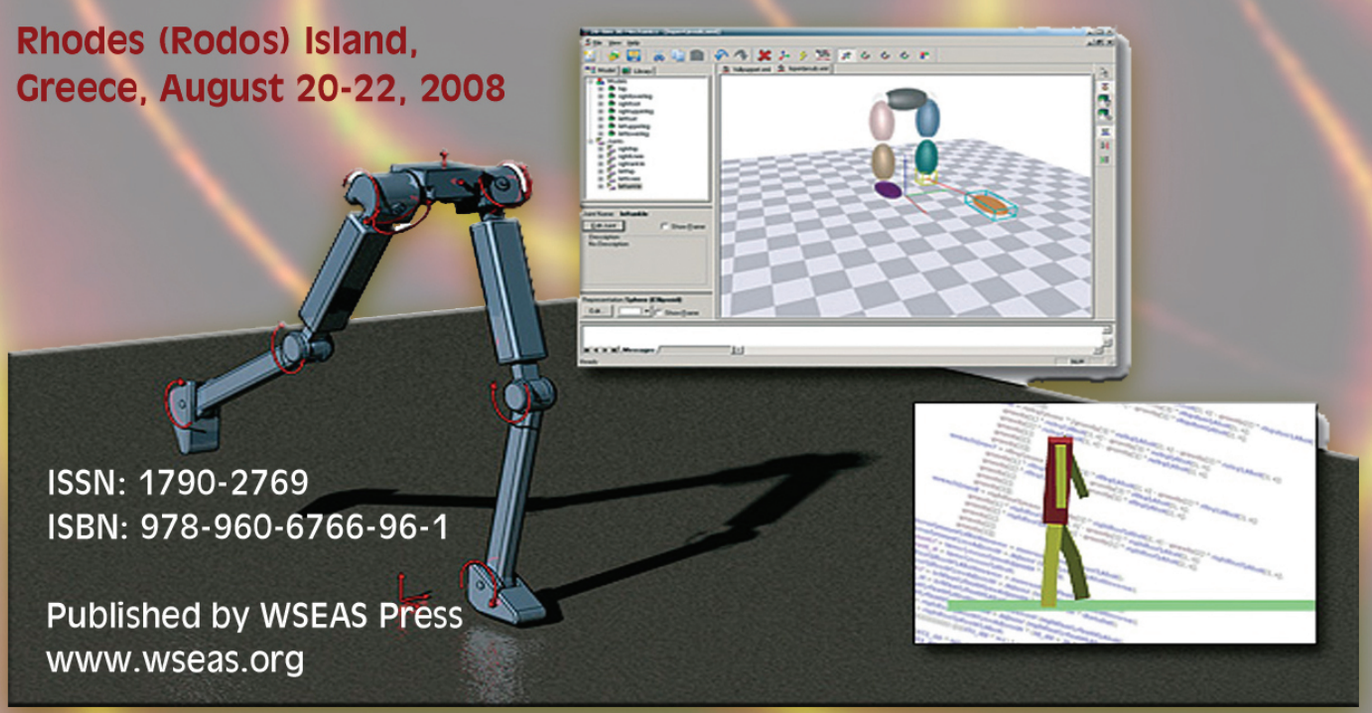
NEW ASPECTS OF SYSTEMS THEORY AND SCIENTIFIC COMPUTATION

Proceedings of the 8th WSEAS International Conference on
SYSTEMS THEORY and SCIENTIFIC COMPUTATION (ISTASC'08)

Mathematics and Computers in Science Engineering
A Series of Reference Books and Textbooks

Rhodes (Rodos) Island,
Greece, August 20-22, 2008



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Preface

This book contains the proceedings of the 8th WSEAS International Conference on SYSTEMS THEORY and SCIENTIFIC COMPUTATION (ISTASC'08) which was held in Rhodes, Greece, August 20-22, 2008. This conference aims to disseminate the latest research and applications in Systems Theory, Dynamical Systems, Control Systems,Modelling, Neural Networks, Fuzzy Systems, Evolutionary Compuation, Linear Programming, Quadratic Programming, Software Development, Communication protocols, Heuristic Algorithms, Numerical Linear Algebra, Optimization and other relevant topics and applications.

The friendliness and openness of the WSEAS conferences, adds to their ability to grow by constantly attracting young researchers. The WSEAS Conferences attract a large number of well-established and leading researchers in various areas of Science and Engineering as you can see from **http://www.wseas.org/reports**. Your feedback encourages the society to go ahead as you can see in **http://www.worldses.org/feedback.htm**

The contents of this Book are also published in the CD-ROM Proceedings of the Conference. Both will be sent to the WSEAS collaborating indices after the conference: **www.worldses.org/indexes**

In addition, papers of this book are permanently available to all the scientific community via the WSEAS E-Library.

Expanded and enhanced versions of papers published in this conference proceedings are also going to be considered for possible publication in one of the WSEAS journals that participate in the major International Scientific Indices (Elsevier, Scopus, EI, ACM, Compendex, INSPEC, CSA .... see: www.worldses.org/indexes) these papers must be of high-quality (break-through work) and a new round of a very strict review will follow. (No additional fee will be required for the publication of the extended version in a journal). WSEAS has also collaboration with several other international publishers and all these excellent papers of this volume could be further improved, could be extended and could be enhanced for possible additional evaluation in one of the editions of these international publishers.

Finally, we cordially thank all the people of WSEAS for their efforts to maintain the high scientific level of conferences, proceedings and journals.

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Plenary Lecture I

A Performance Analysis of Some New Goeken-Johnson Methods versus the Classical Runge-Kutta Methods

Professor Adrian Ionescu
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Abstract: The autonomous ordinary differential equation initial-value problems are traditionally solved numerically by using the Runge-Kutta methods. These methods perform multiple evaluations of the function. A few years ago, some new Runge-Kutta methods are introduced by Goeken & Johnson, in which the user will evaluate both the function and derivative. We compare the classical Runge-Kutta methods of orders 3, 4 and 5, and the corresponding new Goeken-Johnson methods. These results (for performance and accuracy) indicate that the new methods are at least comparable if not better than the classical methods.

Brief Biography of the Speaker: Adrian Ionescu is a Professor of Mathematics and Computer Science at Wagner College. He received his Ph.D. in Mathematics from Texas A&M University, his M.S. in Computer Science from University of Houston, and his B.S./M.S in Mathematics from University of Bucharest. His research areas include functional analysis, system analysis, numerical analysis, and theory of computation.

Plenary Lecture II

The Minimum Energetical Principle in Stationary Regime for Electric and Magnetic Circuits

Professor Horia Andrei
Valahia University of Targoviste
Electrical Engineering Faculty
Co-author: Fanica Spinei
Politehnica University of Bucharest
Electrical Engineering Faculty
Romania

Abstract: The paper describes the authors' further preoccupation towards an extension of the minimum energetic principle in stationary regime established for the d.c. and a.c. circuits, to the linear magnetic circuits and to the electric circuit with capacitors. Is tried to give an interpretation to the results obtained from the minimization of an energetic functional corresponding to the circuit under study.

Brief Biography of the Speaker: Horia Andrei (M'06) received the Ph.D. degree in Electrotechnical Engineering, from the Politehnica University of Bucharest, Romania, in 1996. Since 1982 he has been working at the Electrical Engineering Department of Politehnica University of Bucharest until 2002, and currently he is a Professor at the Electrical Engineering Faculty, Valahia University of Targoviste, Romania. His research activities include the design and analysis of circuits, symbolic methods for analogue circuits, applications of computer algebra in analysis and design of circuits and systems, electrical measurements and power systems analysis. Dr. Andrei is a member of IEEE, WSEAS, AMSE, AIEER and SIEAR.

Plenary Lecture III

When did Mitochondrial Eve Live? - Computer Simulations Can Help to Answer the Question.

Professor Krzysztof A. Cyran
Institute of Informatics,
Silesian Univ. of Technology,
Gliwice, Poland
Email: Krzysztof.Cyran@polsl.pl

Abstract: One of the crucial issues in contemporary evolutionary genetics is the problem of dating the common ancestors of different species. It is a well-known fact that the results of analysis of genetic variation are affected by history of given population. Applicability of several existing approaches based on coalescence theory is limited to deterministic population histories, known to be unrealistic in the case of our own species. In the lecture the computer simulation-based approach will be presented, which is capable of dealing with arbitrary population history scenarios, including populations evolving stochastically and/or with environmental changes. This approach arises from the comparison of O'Connell model of branching processes genealogy and Wright-Fisher model of genetic drift. The latter assumes multinomial sampling between generations and thus asymptotically Poisson distribution of the number of progeny for any individual. Since the assumptions of this model are not always fulfilled in reality, there exists a problem of the influence of the departure from WF model on the distribution of the coalescence time and further analysis of genetic variation. The lecture will show an attempt to solve the problem using time-forward computer simulations of branching processes and numerically approximated distribution of coalescence time for a pair of alleles. There have been performed simulations of over 105 human population histories evolving for 104 generations. Assuming the human generation length to be approximately 20 years, each simulation history corresponds to 200,000 years. Simulations of so many trajectories modeling such long periods in an unbiased way excluded the use of built-in pseudo-random number generator. The reason for that is either too short range of generator aperiodicity or failing some statistical tests. Therefore there was implemented an advanced random number generator being the composition of two other generators. This advanced generator had the desirable aperiodicity length of 2144, furthermore, it satisfied known statistical tests. These methods were applied to estimate the age of our most recent female common ancestor, often called Mitochondrial Eve. The estimates are based on the genetic material taken from hyper variable region I (HVRI) and hyper variable region II (HVRII) of mitochondrial DNA belonging to contemporary humans and Neanderthal fossils. Obtained results indicate that after changing the outgroup from chimpanzee to Neanderthals, the stochastic genetic models with different assumptions tend to give similar predictions, and therefore these predictions are much more reliable than they were before. Moreover, these estimates are very similar to those obtained lately by other researchers with the use of phylogenetic trees, which increases reliability of both estimates obtained by conceptually different methods.

Brief Biography of the Speaker: Krzysztof Cyran was born in 1968, in Cracow, Poland. He received MSc degree in computer science (1992) and PhD degree (with honours) in technical sciences with specialty in computer science (2000) from the Silesian University of Technology SUT, Gliwice, Poland. His PhD dissertation addresses the problem of image recognition with the use of computer generated holograms applied as ring-wedge detectors. In 2003-2004 he was a Visiting Scholar in Department of Statistics at Rice University in Houston, US. He is currently the Assistant Professor and the Vice-Head of the Institute of Informatics at SUT.

Dr Cyran has received several awards of the Rector of the SUT for his scientific achievements. In 2004-2005 he was a member of International Society for Computational Biology. He is a member of the Editorial Board of Journal of

Biological Systems and a reviewer for Optoelectronic Review, Mathematical Biosciences and Engineering, and Studia Informatica.

He has been an author and co-author of more than 60 technical papers in journals (several of them indexed by Thomson Scientific) and conference proceedings, and has been involved in numerous statutory projects led at the Institute and some scientific grants awarded by the State Committee for Scientific Research. His current research interests are in image recognition and processing, artificial intelligence, digital circuits, decision support systems, rough sets, computational population genetics and bioinformatics.

Special Session I

Artificial Intelligence Applications in Power Systems

Organizer:

Assistant Professor Lambros Ekonomou
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Hellenic American University,
IT Faculty, 12 Kaplanon Str., 106 80 Athens,
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E-mail: leekonom@gmail.com

Brief Biography of the Organizer:

Lambros Ekonomou was born on January 9, 1976 in Athens, Greece. He received a Bachelor of Engineering (Hons) in Electrical Engineering and Electronics in 1997 and a Master of Science in Advanced Control in 1998 from University of Manchester Institute of Science and Technology (U.M.I.S.T.) in United Kingdom. In 2006 he graduated with a Ph.D. in High Voltage Engineering from the National Technical University of Athens (N.T.U.A.) in Greece. In June 2007, he was appointed Assistant Professor in the Hellenic American University, while he has worked with various companies including Hellenic Public Power Corporation S.A. and Hellenic Aerospace Industry S.A. His research interests concern high voltage engineering, transmission and distribution lines, lightning performance, lightning protection, stability analysis, control design, reliability, electrical drives and artificial neural networks.

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