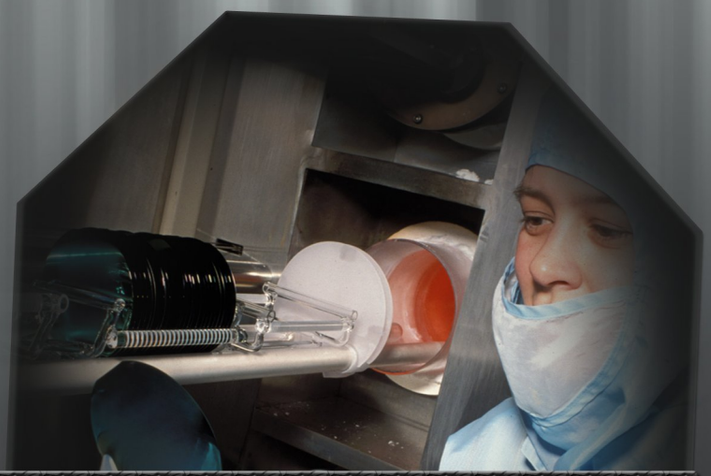
Editors: N. Mastorakis, V. Mladenov, Z. Bojkovic



Latest Trends on Circuits

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14th WSEAS International Conference on Circuits
(Part of the 14th WSEAS CSCC Multiconference)

Corfu Island, Greece, July 22-24, 2010

ISSN: 1792-4227
ISBN: 978-960-474-198-4

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All papers of the present volume were peer reviewed by two independent reviewers. Acceptance was granted when both reviewers' recommendations were positive.
See also: http://www.worldses.org/review/index.html

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World Scientific and Engineering Academy and Society

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Preface

This year the 14th WSEAS International Conference on CIRCUITS (Part of the 14th WSEAS CSCC Multiconference) was held on Corfu Island, Greece, July 22-24, 2010. The conference remains faithful to its original idea of providing a platform to discuss network theory and applications, nanostructures and nanotechnologies, molecular electronics, molecular computing, circuits and networks inspired from biology, metabolic networks, microelectronics, microcircuits, optoelectronic devices, circuits and systems for control and robotics, superconductivity circuits, electron devices for video technology, numerical analysis and circuits, logic synthesis, fuzzy logic and circuits design, circuit implementation for fuzzy systems, circuit modelling and scientific computing with applications in science and engineering 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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Keynote Lecture 1

Optimizing the Performance of Scientific Java Applications

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Abstract: As part of its type-safety regime, the Java semantics require precise exception at runtime when programs attempt out-of-bound array accesses. In general, this requires a dynamic bounds check each time an array element is accessed, which limits the performance of array intensive scientific applications implemented in Java. However, if it can be proven that the array index is within the bounds of the array, the check can be eliminated. We present a new algorithm based on extended Static Single Assignment (eSSA) form that builds a constraint system representing control flow qualified, linear constraints among program variables derived from program statements. Our system then derives relationships among variables, and provides a verifiable proof of its conclusions. This proof can be verified by a runtime system to minimize the analysis' performance impact. Our system simultaneously considers both control flow and data flow when analyzing the constraint system, handles general linear inequalities instead of simple difference constraints, and provides verifiable proofs for its claims. We present experimental results demonstrating that this method eliminates more bounds checks than prior approaches with minimal overhead during JIT compilation. Furthermore our algorithm increased the speed at which the Java benchmarks executed by up to 16%.

Brief Biography of the Speaker:
Kleanthis Psarris is Professor and Chair of the Department of Computer Science at the University of Texas at San Antonio. He received his B.S. degree in Mathematics from the National University of Athens, Greece in 1984. He received his M.S. degree in Computer Science in 1987, his M.Eng. degree in Electrical Engineering in 1989 and his Ph.D. degree in Computer Science in 1991, all from Stevens Institute of Technology in Hoboken, New Jersey. His research interests are in the areas of Parallel and Distributed Systems, Programming Languages and Compilers, and High Performance Computing. He has designed and implemented state of the art program analysis and compiler optimization techniques and he developed compiler tools to increase program parallelization and improve execution performance on advanced computer architectures. He has published extensively in top journals and conferences in the field and his research has been funded by the National Science Foundation and Department of Defense agencies. He is an Editor of the Parallel Computing journal. He has served on the Program Committees of several international conferences including the ACM International Conference on Supercomputing (ICS) in 1995, 2000, 2006 and 2008, the IEEE International Conference on High Performance Computing and Communications (HPCC) in 2008, 2009, and 2010, and the ACM Symposium on Applied Computing (SAC) in 2003, 2004, 2005 and 2006.

Plenary Lecture 1

Cellular Neural/Nonlinear/Nanoscale Network (CNN) Approach for Solving Equations from Mathematical Physics

Professor Angela Slavova
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Sofia, Bulgaria
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Abstract: Spatial and spatio-temporal patterns occur widely in physics, chemistry and biology. In many cases, they seem to be generated spontaneously. These phenomena have motivated a great deal of mathematical modelling and the analysis of the resultant systems has led to a greater understanding of the underlaying mechanisms. Partial differential equations of diffusion type have long served as models for regulatory feedbacks and pattern formation. We are witnessing a technical development in our fields where the sensing, computing, activating circuits and systems are becoming inherently connected; physically and theoretically, as well. Moreover, as a result of this, our notion about sensory computing, even about computing, is in a continuous transformation. Hence, we have to make a closer look about the fundamentals of computing.

Brief Biography of the Speaker:
Prof. Slavova graduated at Technical University, Russe, Computer Engineering, M. Sc. in 1986. In the period 1992-1993 she got Fulbright Scholarship at Florida Institute of Technology, Florida, USA. She got her Ph.D. in Mathematics in 1994. In 2005 she became Doctor of Science and in 2007 Full Professor at the Institute of Mathematics and Informatics, Bulgarian Academy of Sciences. Since 2004 Prof. Slavova is a Head of the Department of Mathematical Physics, Institute of Mathematics, Bulgarian Academy of Sciences. She participated in more than 30 conferences, workshops and seminars as an invited speaker. She got in the period January-July 1998 - CNR Fellowship, University of Florence, Italy. She was visiting professor at the University of Ioannina, Greeece, University of Catania, Italy, University of Torino, Italy, Astronomical Observatory, Torino, Italy, College of Judea and Samaria, Ariel, Israel, University of Ferrara, Italy, University of Bologna, University of Florence, Italy, Ben-Gurion University, Israel, etc. Professor Slavova has more than 60 publications in prestigious journals in Applied Mathematics, IEEE Journals, etc. She is an author and co-author of 2 monographs. Prof. Slavova is a member of AMS, SIAM, Board of Bulgarian Section of SIAM, Board of Bulgarian Section of WSEAS, EMS, IEEE Technical Committee on CNNAD.

Plenary Lecture 2

Analytical Approaches for Solving Neutron Transport Problems

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Abstract: The neutron flux is obtained as the solution of a Boltzmann transport equation. In its various integro-differential forms, this equation can be used to solve problems from the following fields: nuclear physics, astrophysics, radiative transport and transport of particles in porous media. In the literature there are several approaches based on the numerical methods as: the least squares method , the finite element method, Monte Carlo method, Fourier transform, Laplace transform, spherical harmonics or PN method, Jacobi polynomials approximation, truncated series of Chebyshev polynomials. In this paper we replace our neutron transport problem with an equivalent problem of radiative transfer. The exact solutions for stationary and non-stationary neutron transport equations corresponding to various source functions are presented. Some adjustments were made to agree the neutron transport theory with astrophysical applications.

Brief Biography of the Speaker:
Olga Martin graduated the Faculty of Mathematics and Mechanics, University of Bucharest, Romania. She received his PhD in mathematics with the specialization in Dynamic Plasticity with paper work 'Applications of the Finite Element Method in Dynamic Plasticity'. During of twenty years, she had been senior researcher in Aircraft Institute, Strength Materials Department. Technical experience: structural strength computing reports using ANSYS program (wing-fuselage, fuselage frame, fin, elevator, rudder and aileron), dynamic and static test-programs for aircraft structures, fatigue test-programs for aircraft structures, iterative methods for the study of the reactions, which correspond to movable control surfaces, attached at n – points to an elastic structure and program of this, static and fatigue computation of the propeller (mono-bloc hub, blades and blades retention system).
Nowadays, she is Professor at Applied Sciences Faculty, University "Politehnica" of Bucharest. Fields of specialization: Mathematical Analysis, Mathematical Physics, Computational and Experimental Solid Mechanics, Numerical Analysis, Statistical Calculus. She has published over 90 research papers and 18 books.
Member of the editorial boards: Politehnica Sci. Bull. Series A, WSEAS Transactions on Applied and Theoretical Mechanics, WSEAS Transactions on Mathematics and she was involved in the program/organizing committees for many international conferences.
Membership of Professional Societies: Society of Computer Aided Engineering – Member National Union of Romanian Scientists (Founding member), Balkan Society of Geometers member, Romanian Society of Mathematicians.
Reviewer: WSEAS Press (books and journals), Scientific Bulletin, University "Politehnica" of Bucharest
Scientific Evaluation Societies: RELANSIN, University "Politehnica" of Bucharest, ARACIS, Bucharest, Bucharest, National Science Fund of Bulgaria.

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