



# COMPUTATIONAL METHODS AND APPLIED COMPUTING

Proceedings of the APPLIED COMPUTING CONFERENCE (ACC '08)

Istanbul, Turkey, May 27-30, 2008

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

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# COMPUTATIONAL METHODS AND APPLIED COMPUTING

Proceedings of the APPLIED COMPUTING CONFERENCE (ACC '08)

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## Preface

This book contains the proceedings of APPLIED COMPUTING CONFERENCE (ACC '08) which was held in Istanbul, Turkey, May 27-30, 2008. This conference aims to disseminate the latest research and applications in: Software Engineering, Hardware Engineering, Data Bases, Expert Systems, Artificial Intelligence, Knowledge Engineering, Industrial systems, Autonomic and autonomous systems, Knowledge data systems, Knowledge Mining, Web-based education, E-Activities (E-Commerce, E-Education, E-Health, E-Government), Security, Cryptology, Computer Vision, Intelligent Techniques, Computer Logic, Multimedia, Video Systems, Internet Technologies, Signal Processing, Image Processing, Language-Speech processing, Digital Systems Design, Remote Sensing, Quantum Computing, Nano-Computing, DNA Computing and Biologically Inspired Algorithms, Robotics, Computer Vision, Visualization and Virtualization, Computational Intelligence (Neural Networks, Fuzzy Logic, Evolutionary Computing), Cognitive Systems, Systems performance, Networking and Telecommunications, Digital Communications, Applied Electromagnetics (Microwaves, Antennas, Radar, Scattering), Numerical Analysis and Scientific Computation, Algorithms and Complexity, Graph Theory, Pattern Recognition, Parallel and Distributed Systems, Supercomputing, Computers in Education.

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](http://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 these 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](http://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

### An Agent and Virtual Reality Based Online Course Delivery System



**Professor M. Nasseh Tabrizi**

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**Abstract:** The Virtual Reality (VR) technology used in this project comprise an emerging medium demonstrated in many areas already familiar to today's students, such as computer games, entertainment systems, and visualization. We believe that existing online course delivery systems are not capable of giving high-quality interactive lecture content, and that existing systems are quite labor-intensive for the faculty member, a true barrier to DE development. Tabrizi's Agent and Virtual Reality (AVR) system is designed to provide the instructor an environment to teach in the virtual setting similar to the face-to-face classroom. The instructor teaches using the uniquely designed whiteboard and PowerPoint slide presentation both integrated in the VR environment. The virtual classroom's message board allows student/instructor interaction and communication to take place. The students observe the online lecture in VR class resembling a face-to-face classroom. The students can (individually) look around, can observe the lecture, and adjust the environment to suit their personality. Moreover, the students can use the message board (integrated within the classroom) to interact with others participants in our virtual classroom. The VR system's strengths are: • The students' interface will enable re-generation of the 3D environment resembling real face-to-face classroom. The bandwidth requirement is reduced significantly, ensuring the functionality of the system in areas with slow network infrastructure. Students can interrupt the teacher and ask questions in a manner that mimics the traditional classroom. The lectures and discussion can be archived for students to reference in the future. The technology goals for this project include implementation and evaluation of non-traditional systems that redefine the role of technology in learning. Delivering lectures using the AVR system will result in the creation of a virtual world to enhance and enrich the learning experience of distance education students by creating real-time lecture and class discussion. This will further be deliverable in low-bandwidth rural areas of the country.

**Brief Biography of the Speaker:** Tabrizi received his B.Sc. in Computer Science from Manchester University, UK. He then completed his M.Sc. and Ph.D. from Automatic Control and Systems Engineering Department, Sheffield University, UK. Tabrizi worked in Manchester University for two years prior to his appointment at East Carolina University in 1984. He is now working as a professor of Computer Science at East Carolina University. His research interests are in the areas of Virtual Reality, Modeling and Simulation, Computer Vision, Signal and Image Processing, Software Engineering Education, Internet and Multimedia, Software Process Modeling, Object Oriented Analysis and Design, Assistive Technologies, and Computer Science Education. Starting in 2008, a new degree program will be launched here at East Carolina University (ECU), a Master of Science in Software Engineering degree. This will be the first ever program of its kind in the state of North Carolina as it combines the disciplines of computer science and engineering developed by Dr. Nasseh Tabrizi who is the graduate director for Computer Science and the Software Engineering programs the goal that has been a long time in the making. Tabrizi and his research team have prototyped different major project in his Technology Innovation lab involving Archival Data Extraction and Assessment (ADEAP) system. Also, has developed an electronic medical records management system where methodologies for the entry of research-quality data in the clinical setting and replacement of free text entry of clinical data with a fixed lexicon are performed. A prototype was developed for representing virtual filing cabinet and data extraction from historical handwritten documents. Six major educational models: (1) Virtual University. (2) E-class, a multimedia-based online course delivery system (3) an interactive real-time learning system that uses pocket PCs within the classroom environment (4) AVR, an agent and virtual reality-based online course delivery system. (5) RFID based learning assessment system. (6) Virtual Reality based Home Visit system has also been developed.

## Plenary Lecture II

### Local Deformations and Singular Linear System Theory. Bifurcation Diagrams



**Professor Maria I. Garcia-Planas**  
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08038 Barcelona, Spain

*Abstract:-* In this work we consider differentiable families of triples of matrices  $\varphi(\xi) = (E(\xi), A(\xi), B(\xi))$  with the parameter vector  $\xi \in R^k$ , representing families of singular linear time invariant systems in the form  $E(\xi)\dot{x}(t) = A(\xi)x(t) + B(\xi)u(t)$ , with  $E(\xi), A(\xi) \in M_n(C)$ ,  $B(\xi) \in M_{n \times m}(C)$  for each  $\xi$ . In this paper, we show that we can reduce locally the family to a special typically more simple form, called the versal deformation, by a smooth change of parameters and a proportional and derivative feedback equivalence transformation. As an application, this procedure is applied to the analysis to the neighborhood of a fixed system, showing bifurcation diagrams of critical points.

**Brief Biography of the Speaker:** Professor Dr. Maria Isabel Garcia-Planas joined the Department of Applied Mathematics at the “Universitat Politecnica de Catalunya” Barcelona, Spain in 1981. Her work had been centered on Linear Algebra, Systems and Control Theory. She has authored over eighty papers and serves on the referee on several journals. She has been plenary Speaker in WSEAS Int. Conf. on Applied and Theoretical Math, Vravrona, Grecia (2000), WSEAS International Conference SIM'01, Qawra, Malta, (2001), 6th WSEAS CSCC, Creta, (2002), 4th WSEAS-ISTACS. Puerto de la Cruz, (2004), 8th WSEAS Int. Conference on Applied Mathematics, Puerto de la Cruz, (2005), 11th WSEAS Int. Conf. on Systems, Creta, (2007).

## Plenary Lecture III

### Complex Adaptive Signal Processing Employing Independent and Optimal Convergence Factors with Applications in Time-Varying Environments



**Professor Wasfy B Mikhael**

Fellow IEEE, and Raghuram Ranganathan  
Professor of Electrical and Computer Engineering  
Director of Digital Signal Processing Laboratory  
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**Abstract:** The increased usage of complex signal representations has necessitated the need for improved complex signal processing techniques. Complex adaptive signal processing techniques are presented, which independently adjust the real and imaginary components of the complex quantities, employing optimal convergence factors. Extensive simulations confirm the improved performance of the proposed methods, especially in dynamic scenarios. The effectiveness of these novel techniques will be illustrated in several applications.

**Brief Biography of the Speaker:** Wasfy B. Mikhael (Fellow, IEEE, 1987, for contributions to hybrid and integrated filtering circuits and systems) is a Professor in the School of Electrical Engineering and Computer Science, University of Central Florida (UCF), Orlando. His research and teaching interests are in analog, digital, and adaptive signal processing for one and multidimensional signals and systems, with applications. His present work is in Wireless Communications, Automatic Target Recognition, Image and Speech compression, Classification and Recognition of speakers and facial images. He has more than 250 refereed publications, and holds several patents in the field. He serves on editorial boards, has chaired several international, IEEE and other, conferences, has served as VP for the IEEE Circuits and Systems Society, etc. He is currently the Chair of the Midwest Symposium on Circuits and Systems steering committee membership.

## Plenary Lecture IV

### Malliavin Calculus of Bismut Type in Semi-Group Theory



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**Abstract:** The talk is divided in 5 parts. In the first part, we translate Malliavin Calculus of Bismut type in semi group theory, giving a sufficient condition in order a diffusion semi-group has a smooth density. In the second part, we translate Varadhan estimates for hypoelliptic diffusions in semi-group theory, estimates we got a long time ago by using the Brownian motion. In the third part, we translate in semi-group theory the Ben Arous and us theorem giving a sufficient condition in order an heat-kernel is strictly positive, where the Bismutian semi-distance plays an important role. In the fourth part, we translate one of the result we got a long time ago by probability by using a stochastic analog of the Rothschild-Stein inhomogeneous division method. In the fifth part, we translate in semi-group Bismut's ways of the Malliavin Calculus for Poisson process where the generator is an integro-differential operator.

**Brief Biography of the Speaker:** Remi Leandre was born in Belfort (France). He is Directeur de recherches Seconde Classe. Universite de Dijon. He Organised of various conferences: "Loops spaces" (Strasbourg 1994) with S. Paycha and T. Wuerzbacher, "Probability and geometry" (Nancy 1999), "Infinite dimensional analysis" (C.I.R.M. 2001), Also he I have organized a session "Analysis on path spaces" at the Satellite Conference of Stochastic Analysis of I.C.M. at Beijing (2002), "Infinite dimensional analysis and path integrals" (C.I.R.M 2004) with C. De Witt-Morette and "Stochastic analysis and mathematical physics" (Dijon. 2006).