APPLIED AND COMPUTATIONAL MATHEMATICS

Proceedings of the 13th WSEAS International Conference on APPLIED MATHEMATICS (MATH'08)

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Nestor Thome, SPAIN
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Nobutoshi Ikeda, JAPAN
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Noraini Abdullah, MALAYSIA
Norhashidah Ali, MALDIVES
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Preface

This book contains the proceedings of the 13th WSEAS International Conference on APPLIED MATHEMATICS (MATH'08) which was held in Puerto De La Cruz, Tenerife, Canary Islands, Spain, December 15-17, 2008. This conference aims to disseminate the latest research and applications in Linear Algebra and Applications, Numerical Analysis and Applications, Differential Equations, Multilinear Algebra, Numerical Methods for Solving Equations, Ordinary Differential Equations, Partial Differential Equations, Theoretical Probability Theory 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.

Table of Contents

Plenary Lecture I

Direct and Time Reverse Problems for Hyperbolic Heat Equation - New Models for Intensive Steel Quenching Processes

Professor Andris Buikis
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Abstract: Intensive quenching processes are important branches of modern metallurgical technologies. In new ecologically clean steel quenching processes important aspect is the heat exchange with the surrounding cold water. But the type of heat exchange is mostly defined by initial heat flux densities: if initial heat flux density is higher as first critical heat flux density, then the full film boiling is observed. If the initial heat flux density is lower, then the nucleate boiling establishes on the sample's surface. This is the preferable type of heat exchange process, because it provides the intensity of the process and defines the quality of the obtained material. In 2005 we proposed the hyperbolic heat equation as mathematical model for intensive steel quenching process. In several papers during 2005-2008 we have developed some approaches (Green function method, original conservative averaging method) for the solving of ill-posed time reverse problems for the parabolic part of the hyperbolic heat equation. These ideas gave quite good compatibility of theoretical and experimental initial heat flux densities.
In this lecture we develop some new ideas for the solving of time reverse problems for the hyperbolic heat equation. They lead us to well-posed statements for determination of initial heat fluxes instead of ill-posed statements as it was in our previous papers.

Brief Biography of the Speaker:

Professor Andris BUIKIS

- Professor, University of Latvia, Faculty of Physics and Mathematics, Department of Mathematics
- Head of Laboratory of Mathematical Technologies, Institute of Mathematics and Computer Science, University of Latvia

Born: March 15, 1939, Valka, Latvia

Interests:

- Mathematical Modelling
- Mathematical Problems of Heat and Mass Transfer, Especially for Layered Media
- Analytical and Numerical Methods for Partial Differential Equations
- Innovative Energetic
- Philosophy of Science

Languages: German, English, Latvian, Russian

Education:

- University of Latvia (Faculty of Physics and Mathematics), 1963
- Dr.math. (Candidate of Science in former USSR), University of Latvia, 1970
- Dr.habil.math. (Doctor of Science in former USSR), University of Kasan, Russia, 1988
- Professor, University of Latvia, 1991

Experience:

- Junior Researcher, Senior Researcher, Computing Centre, University of Latvia, 1962 - 1972
- Assistant Professor and Head of Chair of Applied Mathematics, Faculty of Physics and Mathematics, University of Latvia, 1972 - 1976
- Assistant Professor and Head of Chair of Differential Equations and Numerical Methods, Faculty of Physics and Mathematics, University of Latvia, 1976 - 1984
- Senior Researcher, Faculty of Physics and Mathematics, University of Latvia, 1984 - 1986
- Assistant Professor, Chair of Differential Equations and Numerical Methods, Faculty of Physics and Mathematics, University of Latvia, 1986 - 1988
- Senior Researcher, Head of Laboratory of Mathematical Physics, Institute of Physics, Latvian Academy of Sciences, 1988 - 1991
- Director, Institute of Mathematics, Latvian Academy of Sciences and Latvian University, 1991 - 1996; 2003 - 2006
- Head of Laboratory of Mathematical Physics (1996 -2006) and Head of Scientific Council (1996 – 2003), Institute of Mathematics, Latvian Academy of Sciences and Latvian University
- Director, Science and Dialogue Centre of Latvia, 1993 -2007
- Head of Laboratory of Mathematical Technologies (2006-), Institute of Mathematics and Computer Science, University of Latvia

Honours and Awards:

- Corresponding Member, Latvian Academy of Sciences, 1992 - 1997
- Full Member, Latvian Academy of Sciences, 1997
- The Latvian Academy of Sciences Piers Bohl Prize for a cycle of papers “Method of Conservative Averaging, Theory and Applications”, 2005
- Member of Board, Soros Foundation - Latvia, 1997
- Head of "Spidola" Council, Culture Foundation of Latvia, 1987 - 1992
- Member of Board, Vidzemes University College, 1996 - 1998

Professional Activties and Memberships:

- Member, Senate of the Latvian Academy of Sciences, 1994 -
- Member, Vidzeme University College Advisory Board, 1997-2002
- Vice-Chairman (in Mathematics), Latvian Council of Science Expert Committee on "Physics, Mathematics & Astronomy", 1991 - 1993
- Chairman, Promotion Council for Mathematics, 1992 -
- Member, Editorial Advisory Board for Proceedings of the Latvian Academy of Sciences, 1988-1995
- Member, Editorial Advisory Board for Computational Methods in Applied Mathematics, 2000-
- Member of Editorial Advisory Board, Journal Mathematical Modelling and Analysis (The Baltic Journal on Mathematical Applications, Numerical Analysis and Differential Equations), Lithuania, 1999-
- Editor, Progress in Industrial Mathematics at ECMI 2002 , Springer
- Member, Editorial Board for International Journal of Applied Mathematical Sciences (IJAMS), 2004 -
- Member, Gesellschaft Angewandte Matematik und Mechanik, Germany 1991 -
- Member, International Sociological Association, 1998-2002
- Holder of state capital share at The Latvian Institute, 1998 -2004
- Member, American Mathematical Society, 1999 –
- Member, World Scientific and Engineering Academy and Society, 2006-

Plenary Lecture II

Investigating The Relationships Between Airborne Particulate Matter And Meteorological Variables Using Non-Decimated Wavelet Transform

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Abstract: Malaysia has experienced several haze periods since early 1980s in which suspended particulate matter was the major components. The temporal variations observed in suspended particulate matter concentrations are the result of interactions of various meteorological variables and pollutants emissions in different time scales. In order to study the relationships between particulate matter, temperature and wind speed, non-decimated wavelet transform was applied to the time series. The time series registered significant relationships between meteorological variables and PM10 for low frequency components. While for the high frequency components, the relationships were not significant. The correlations between PM10 and temperature were found positive. The correlations between PM10 and wind speed registered both positive and negative correlations. The findings also support the suggestion that during the dry season, one of the major sources of particulates was from outside the country.

Brief Biography of the Speaker: Azami Zaharim worked first 13 years as a lecturer in the Universiti Teknologi MARA (University of MARA Technology - UiTM) before joining the Universiti Kebangsaan Malaysia (National University of Malaysia - UKM) in the year 2003. He is Associate Professor at the Faculty of Engineering and Built Environment UKM, and is currently Coordinator for the Unit Fundamental Engineering Studies. He obtained his BSc (Statistics and Computing) with Honours from North London University, UK in 1988 and PhD (Statistics) in 1996 from University of Newcastle Upon Tyne, UK. He specialize in statistics, public opinion, engineering education and renewable energy resources. He has until now published over 80 research papers in Journals and conferences, conducted more than 15 public opinion consultancies and delivered 3 keynotes/invited speeches at national and international meetings. He is currently the head of Renewable Energy Resources and Social Impact Research Group under the Solar Energy Research Institute (SERI). In the year 2007, he headed the Engineering Mathematics Research Group. At the same time, he is currently active involve in outcome based education (OBE) approach at the national level and the chairman of the Engineering Education Research Group since 2005. He is also involved actively in the research for the future of engineering education in Malaysia 2006 under the Ministry of Higher Education of Malaysia.

Plenary Lecture II

Geometric Function Theory and Applications (New Development)

Professor Dr Maslina Darus
Head of Fundamental Studies Unit
Centre of Research Modeling Analysis
&
Head of Mathematics Programme

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Abstract: The theory of analytic univalent function is a classical problem of complex analysis which belongs to a beautiful part of geometric function theory (GFT). To our interest, GFT denotes the part of functions analysis devoted to estimations of different magnitudes related to conformal mapping of one region onto another. Conformal mapping is a classical part of complex analysis having intimately connected with the theory of boundary value problems for harmonic functions, thus has numerous applications in mathematical physics and other branches of mathematics. A large number of generalizations of the class of univalent function have been explored and properties such as distortion theorems, radii and Fekete-Szego theorems are the main interests of solving problems. To date, various methods have been used such as method of differential subordinations, method of differential inequalities and methods of arising from the convolution theory. These are rather some curiosity provoking and recently attracted many other mathematicians to the derivation of new subclasses and new properties. Results from the theory of the geometric function are remarkable by their particular elegance and simplicity of formulations. However, in searching for a new breakthrough in the field, new approach and new development are indeed needed.

Brief Biography of the Speaker: Maslina Darus started her career in Universiti Kebangsaan Malaysia(UKM) in 1992 as a Tutor at the Department of Mathematics. She pursued her PhD (Mathematics) in University of Wales, Swansea, United Kingdom late September 1992. She specialized in Complex Analysis (Geometric Function Theory) and obtained her PhD in July 1996. She has been appointed as a lecturer at UKM in the duration of 1996-2000 and appointed as Associate Professor in the duration of 2001-2005. In 2002, she has been awarded the "National Young Scientist Award" by the Ministry of Science and Technology, Malaysia. She has been promoted to full Professor in 2006 till present. She has until now published over 170 research papers in Journals internationally and nationally. She is currently the Head of Fundamental Studies Unit, Centre for Research Modeling Analysis and also acting as Head of Mathematics Programme, School of Mathematical Sciences. She has been actively involved collaborating with many other researchers in the specialized area, namely from Macedonia, Romania, India, China, Turkey and Japan. Concurrent with the mutual interests among the researchers, a specialized conference with the theme "New Development of Geometric Function Theory and its Applications" is organized jointly between UKM and Kinki University, Japan. The conference is scheduled in November 10-13, 2008.