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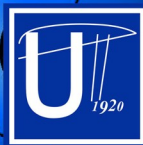
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Recent Advances in Intelligent Control, Modelling & Computational Science

- Proceedings of the 1st International Conference on Computational Science and Engineering (CSE '13)
- Proceedings of the 1st International Conference on Intelligent Control, Modelling and Systems Engineering (ICMS '13)

Valencia, Spain, August 6-8, 2013

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Plenary Lecture 1

A New Numerical Approach to Handle the Interface Conditions in Equations of Elasticity



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Abstract: This work deals with the crack problem simulation in dissimilar media. It proposes a new numerical approach derived from a Nitsche type method for handling interface conditions in the Elasticity equations. The Nitsche method, introduced to impose weakly essential boundary conditions in the scalar Laplace operator, has been then worked out more generally and transferred to continuity conditions. We propose here an extension of this method to the Navier-Lame equations. We derive a variational formulation that provides the solution in terms of displacements eld in the case of a crack existence in a plate domain, made of several different layers characterized by different material properties. We formulate the method for both the homogeneous and the dissimilar material domains and report some numerical experiments.

Brief Biography of the Speaker: Prof. Franck Assous received a Ph.D. degree in Applied Mathematics from the University of Paris (France). He then received the French "Habilitation a Diriger les Recherches" degree from the University of Toulouse (France). He worked more than 14 years at the Atomic French Agency (CEA) as a senior researcher. In parallel, he was teaching at the ENSTA School of Engineers (Paris) as an Assitant Professor, then at the Versailles University as an Associate Professor. He is currently working in Israel, where he is Professor of Applied Mathematics at the Ariel University Center (Israel), and at the Bar-Ilan University (Israel). His research project include numerical methods for Partial Differential Equations, with a particular interest for problems arising from models in the field of computational electromagnetism, plasma physics, elasticity. He is also interested in inverse problem in wave propagation problems.

Plenary Lecture 2

Educational Reform for Sustainable Development



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Abstract: The need for education is rapidly growing in this Information Age. Education includes both informal & formal education, and at all levels: K-12, undergraduate and graduate. It also includes many areas e.g. Science, Engineering, Mathematics, Technology and Business.

Education has great impact on various things including economic & social development, job creation, and resource creation. Arguably, sustainable development is the most important case that many nations focus on.

To ensure sustainable development, educational reform is essential, especially for underdeveloped and developing countries where poverty level is very high. It is clear that existing education is not adequate (as otherwise poverty level would not be very high) even though it is playing a major role. As mentioned, we need to focus both on formal & informal education, with more emphasis on informal education, for the people in the underdeveloped & developing countries as such countries are dominated by the Base of the Pyramid people (BOP). In fact, to ensure sustainable development, the reform needed seems to be significant both for formal and informal education. For example, existing formal education, in general, is geared towards Western Curricula which in most cases do not show highly effective results for the underdeveloped and developing countries. This is because students graduating in engineering and computer science do not find enough jobs in their own country as there are not many relevant industries. On the other hand, they cannot easily go to Western world and try to get jobs there. Due to the lack of entrepreneurship and innovation, there are not many new companies to attract outsourced projects & create jobs. Some of these issues are also well applicable for general science and other majors. Thus, continuing with the existing way, there will be more graduates using country's valuable resources but with more unemployment (i.e. more graduates than number of jobs), resulting in negative Economical, Social and other impacts.

The key point is to reform education so that it meets country's immediate as well as long term needs, and ensure sustainable development - economic, social, cultural and others, and thus ensure prosperity. For example, most underdeveloped and developing countries are driven by agricultural economy. Thus, an ICT (Information & Communication technology) based Agriculture degree program would be more appropriate so that graduates can actively participate in help developing their country. Graduates should learn how to start new companies & create jobs once graduated as number of jobs are limited. Thus, such Agriculture degree programs need to emphasize on entrepreneurship & innovation. Similarly, informal courses on agriculture for farmers offered through any mobile phone will help farmers increase & improve their produce, reduce food waste and help market & sell their produce. And, of course, appropriate environment and infrastructure need to be set up to facilitate entrepreneurship, innovation & development. Clearly, educational institutions should play a major role in such educational reform including designing and offering new courses & degree programs, and collaborating with respective organizations including the Government. Educational institutions would also need to closely work with the industry and other organizations as appropriate to ensure that the proposed reform indeed help sustainable development.

Education also needs to ensure good learning as otherwise education will not really be effective. Accordingly, new teaching and research methods would need to be developed to ensure learning and effectiveness of education.

Thus, appropriate educational reform is very important to support sustainable development. Educational institutions would need to take the lead in this process. And such a reform is critical for engineering, technology & science education.

This talk will focus on some details of the proposed educational reform, with emphasis on "creativity", "productivity" and "resource" creation. Creativity will in turn drive innovation & entrepreneurship, resulting successful business

entities which in turn will create jobs and help economic, social & other developments. A practical example will be presented using a Farming application that will elaborate the needs of multi-disciplinary, informal & formal education with emphasis on Innovation & Entrepreneurship linked well to industries in a coherent way using a Complete Integrated strategy.

Brief Biography of the Speaker: Dr. Emdad Khan is the Founder of InternetSpeech. He founded the company in 1998 with the vision to develop innovative technology for accessing information on the Internet anytime, anywhere, using just an ordinary telephone and the human voice.

As a pioneer in the Internet voice space, Khan is a frequent speaker at voice-recognition, Internet applications, bridging the Digital and Language Divides and other industry trade shows and conferences. He holds 23 patents and has published more than 40 papers on the advent of voice technology on the Internet, content rendering, Natural Language Processing, neural nets, fuzzy logic, intelligent systems, VLSI and optics. Khan's acute technical knowledge and keen understanding of emerging markets has played an important role in the development of InternetSpeech's first product/service netECHO, the only product available today that delivers complete voice Internet access.

During his career, Khan invented, defined, developed and deployed worldwide new intelligent software products for micro-controller-based home appliances. He has also created and deployed speech recognition Internet applications. He has 20 years of experience with large semi-conductor companies, including Intel and National.

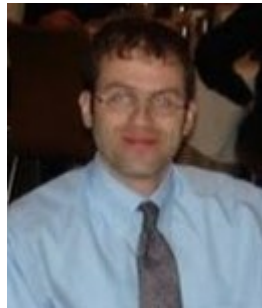
Khan is doing active research. His current major interest is to use brain-like and brain-inspired algorithms to solve some open problems, especially, NLU (Natural Language Understanding) which is very well aligned for InternetSpeech's next generation products & services to allow users (especially bottom of the pyramid people) to interact with the Internet using their natural language.

He holds a doctorate in computer science, master of science degrees in electrical engineering and engineering management and a bachelor of science degree in electrical engineering.

Khan is currently on leave from InternetSpeech and a faculty at the Computer Science department of Imam University, Riyadh, Saudi Arabia. Khan is also a visiting Research Professor at the Southern University in Baton Rouge, Louisiana, USA.

Plenary Lecture 3

Generalized Symmetric Least-Squares Regressions



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Abstract: Ordinary least-squares regression suffers from a fundamental lack of symmetry: the inverse of the regression line of y given x is not the regression line of x given y . Alternative symmetric regression methods have been developed to address this concern, notably: orthogonal regression and geometric mean regression. In this talk a variety of symmetric least-squares regression methods are derived and analyzed, some of which may not have been known or fully explicated. A systematic approach to the derivation, analysis and classification of all symmetric least-squares methods is then described and a numerical procedure for comparing the various methods is presented.

Plenary Lecture 4

Developing a Higher-Cycled Product Design CAE Model: The Evolution of Automotive Product Design and CAE



Professor Kakuro Amasaka

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Abstract: The technological challenge currently facing Japanese companies is simultaneously achieving Quality, Cost and Delivery (QCD) through innovative product design processes in order to come out on top in the face of worldwide quality competition. It is therefore necessary to undertake principle-based research on quality assurance in product design and development by utilizing the latest numerical simulation technology (Computer Aided Engineering, or CAE).

This development requires the more widespread application of CAE. To be useful, CAE processes must explore technological mechanisms and create a generalized model. The author believes that finding solutions to problems with unknown mechanisms may contribute to the creation of better generalized models. To achieve this aim, the advanced manufacturing industry has been faced with the urgent task of drastically reducing their product design times in order to respond quickly to changing consumer needs. One of the most important challenges for manufacturers is strengthening and enhancing CAE analysis in order to achieve high quality in product design processes that are also very brief. To address these issues, the author conducted research on a Higher-cycled Product Design CAE Model employing a Highly Reliable CAE Analysis Technology Component Model.

At present, advanced companies both in Japan and overseas working in the automobile and other industries are working to survive in today's competitive market by expanding their global production. In this study, the author addresses the technological problems of product design bottlenecks at auto manufacturers. The research aims to grasp the dynamic behavior of technical problems using experiments as an empirical approach as well as numerical simulations.

Brief Biography of the Speaker: Dr. Amasaka became a professor of the School of Science and Engineering, and the Graduate School of Science and Engineering at Aoyama Gakuin University, Tokyo, Japan in April 2000. His specialties include: production engineering (Just in Time, JIT and Toyota Production System, TPS), multivariate statistical analysis and, reliability engineering.. Recent research conducted includes: "Science SQC, new quality control principle", "Science TQM, new quality management principle", "New JIT, new management technology principle", "Customer Science", "Kansei Engineering" and numerical simulation (Computer Aided Engineering, CAE).

Positions in academic society and important posts: He is the author of a number of papers on strategic total quality management, as well as the convener of JSQC, JOMSA, and other publications (e.g. POMS in USA and EurOMA in Europe). He has been serving as the vice chairman of JSPM (2003-2007) and JOMSA (2008-2010), the director of JSQC (2001-2003), and the commissioner of the Deming Prize judging committee (2002-present). Now, he is inaugurated as the vice chairman (2009-2010) and the chairman of JOMSA (2011-2012).

Patents and prizes: He acquired 72 patents concerned with quality control systems, production systems, and production engineering and measurement technology. He is a recipient of the Aichi Invention Encouragement Prize (1991), Nikkei Quality Control Literature Prizes (1992, 2000, 2001 and 2010), Quality Technological Prizes (JSQC, 1993 and 1999), SQC Prize (JUSE, Union of Japanese Scientists and Engineers, 1976) and Kansei Engineering Society Publishing Prize (2002).