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Recent Researches in Urban Sustainability and Green Development

Proceedings of the 2nd International Conference on Urban Sustainability, Cultural Sustainability, Green Development, Green Structures and Clean Cars (USCUDAR '11)

Prague, Czech Republic, September 26-28, 2011

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Institute for Environment, Engineering, Economics and Applied Mathematics

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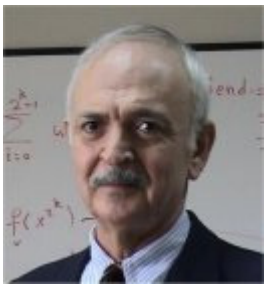
Keynote Lecture 1

Dominating the Constancy in Enhanced Multivariance Product Representation (EMPR) Via Support Function Selection



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Abstract: Enhanced Multivariance Product Representation (EMPR) has been recently proposed by the "Group for Science and Methods of Computing" which is under leadership of Metin Demiralp. EMPR involves High Dimensional Model Representation (HDMR) which was proposed by I.M. Sobol and has been developed basically by H. Rabitz, M. Demiralp and their groups in last two decades. HDMR decomposes a multivariate function to components ordered in ascending multivariance starting from constancy. EMPR introduces "Support Functions" to multiply HDMR components such that the resulting representation becomes composed of terms which have same multivariance as the original function's. Support functions are particularly chosen univariate functions each of which depends on a separate independent variable. The constant component is multiplied by all support function factors while the univariate components are multiplied by all support functions except the one depending on the same independent variable as the relevant univariate component's. As we proceed to higher multivariate components the number of the support function factors decreases because of the discarded factors of same independent variables as the relevant component's. Regarding to this definition HDMR corresponds to the EMPR case where all the support functions are unit constant functions. EMPR, like HDMR, is composed of 2N terms for a multivariate function of N variables. The words "term" and "component" have different meanings in contrast to HDMR. Component implies the function showing a specific multivariance whereas term means the product of the component under consideration by the relevant support functions. The first term of EMPR is the product of the constant component by the all support functions. The next N terms are composed of univariate components multiplied by the corresponding (N ?1) number of support function. The following N(N ?1)/2 terms are composed of the products of the bivariate components with the relevant support functions and so on. The kth group of terms are composed of the product of the kth component by the relevant support functions. Thus, EMPR is also a finite term involving decomposition like HDMR. Despite this finiteness, the number of the terms may grow undesiredly when N tends to grow unboundedly. Hence, not the whole decomposition but its truncations at some multivariate components like preferably constant, more meaningfully univariate, or at most, bivariate ones are desired to be used in practical applications. EMPR components, as in HDMR, are mutually orthogonal, under an appropriately given weight and over a specified orthogonal geometrical hypervolume, and, this permits us to define some functionals we call "Additivity Measurers" or "Quality Measurers", to estimate how constant, univariate or bivariate EMPR is. They reflect the contributions of some level truncations to the target function in norm square. Of course the most lovely case is the constant function although it is somehow trivial. If the constancy can not be achieved exactly then constancy dominancy is sought. Quality measurers form a well ordered sequence between 0 and 1 inclusive, and, the closer constancy measurer to 1 the better numerical efficiency in the truncation at the constant component. Even though there is almost nothing to do for having constant term dominancy in HDMR except the weight function selection, EMPR has more flexibilities, the support functions to this end. By appropriately choosing them it is possible to maximize the contribution of the constant component to the target function in norm square. As proven by us, the constancy of HDMR approaches to 1 when its geometry suppressed to 0 in size, so does the EMPR's. This brings the idea of choosing support functions in such a way that the considered function's weighed integral, giving EMPR's constant component, becomes having asymptotically flat kernel, that is, some number of first derivatives of the kernel vanish at a specified point in the domain of EMPR. Presentation will focus on these issues by also emphasizing on certain practicality aspects.

Brief Biography of the Speaker:
Metin Demiralp was born in Turkey on 4 May 1948. His education from elementary school to university was entirely in Turkey. He got his BS, MS, and PhD from the same institution, Istanbul Technical University. He was originally chemical engineer, however, through theoretical chemistry, applied mathematics, and computational science years he was mostly working on methodology for computational sciences and he is continuing to do so. He has a group (Group for Science and Methods of Computing) in Informatics Institute of Istanbul Technical University (he is the founder of this institute). He collaborated with the Prof. Herschel A. Rabitz's group at Princeton University (NJ, USA)

at summer and winter semester breaks during the period 1985–2003 after his 14 months long postdoctoral visit to the same group in 1979–1980. Metin Demiralp has more than 90 papers in well known and prestigious scientific journals, and, more than 170 contributions to the proceedings of various international conferences. He gave many invited talks in various prestigious scientific meetings and academic institutions. He has a good scientific reputation in his country and he is one of the principal members of Turkish Academy of Sciences since 1994. He is also a member of European Mathematical Society and the chief–editor of WSEAS Transactions on Computers currently. He has also two important awards of turkish scientific establishments. The important recent foci in research areas of Metin Demiralp can be roughly listed as follows: Fluctuation Free Matrix Representations, High Dimensional Model Representations, Space Extension Methods, Data Processing via Multivariate Analytical Tools, Multivariate Numerical Integration via New Efficient Approaches, Matrix Decompositions, Multiway Array Decompositions, Enhanced Multivariate Product Representations, Quantum Optimal Control.

Plenary Lecture 1

Energy Demand in Transport and Environmental Impact

Lecturer Carmen M. Lungoci
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Abstract: Nowadays, aspects regarding energy demand and environmental issues come together in the transport subject.
Data analysis on the energy demand leads to:
- estimate the transport indicators that evaluates the environmental indicators;
- known the evolution of using renewable energy sources;
- define the transport strategies.
All of these allow monitoring the performance of key policies, in order to stimulate energy efficiency and to obtain a sustainable transport. Thus, consumption and emissions are decreased.
In this lecture, the renewable energy sources as alternative solutions used in transport are treated. Based on it, energy strategies for long-distance transport of raw materials are detailed. For presented strategies, an energy demand analysis and environmental impact of emissions is done, with a case study illustrated. Through results obtained, conclusions regarding the relationship energy-transport-environment are presented.

Brief Biography of the Speaker:
Carmen Mihaela Lungoci received the B.Sc. in 1990 on the Automation for Industrial Control from Politehnica University, Bucharest and the M.S.E.E. degree in 2004 from Transilvania University of Brasov.
In 2009 she received the Ph.D. degrees in Electrical Engineering from Transilvania University of Brasov, Romania.
From 2009 she is lecturer at this university, on the Electrical Engineering Department, of the Electrical Engineering and Computers Science Faculty.
Her current research interests include energy and environment, supercapacitors, energy management in automotive systems and control strategies in hybrid systems.
She is author of more than 25 articles, published in proceedings of internationals conferences and journals.

Plenary Lecture 2

Impact measurement for Civitas Success Project

Professor Catalin Popescu
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Abstract: Impact measurement at an international project level supposes the use of an elaborated methodology, a coordinated team to implement, impact's evaluation of such project and designated channels that distribute this evaluation. In order to correctly evaluate the impact, a project it should be divided accordingly to specific domains: environment, economic, social and specific field(s) to which the project is addressed. For example, CIVITAS SUCCESS project, by definition, represents a transport and mobility project and, in order to quantify the mobility impact for this particular project, in this paper, it will be considered specific transport indicators. The evaluation of a project impact and the dissemination of this impact are not meant only to add value to the project but to make it accessible and transferable to persons or institutions which intend to implement the same or a similar project.

Brief Biography of the Speaker:
Dr. Catalin Popescu is Professor of Management at University of Oil and Gas from Ploiesti, Romania. His research and consulting interest include general management, project management, quantitative methods for business and management, human resource management, engineering management, operations management and management information systems. He received in 1991 a degree in Engineering, a degree in Management (2000) and a PhD (2001) in Automated Systems concern Modeling and simulation of production systems, from the University of Oil and Gas from Ploiesti, Romania. Dr. Popescu has published over 125 articles and conference papers, 7 books and he was involved in more than 19 scientific research grants and international projects. He is member of AMIER (Managers and Economical Engineers Association from Romania), COLEAD (International Research Society in Leadership and Organizational Culture), EURAM (European Academy of Management), IBIMA (International Business Information Management Association) and IMTA Alumni Association (International Management Teachers Academy) from Slovenia. His international experience includes presentations and participation with papers in many places all over the world, in more than 20 countries. On the other hand, Dr. Catalin Popescu is now Vicedean of Economics Faculty within University of Oil and Gas from Ploiesti, Romania. Dr. Popescu is assessor in many academic and scientific organizations such as: WSEAS (World Scientific and Engineering Academy and Society), ANCS (National Agency for Scientific Reasearch for the european projects under POS – CCE competition) and ARACIS (Romanian Agency for Quality Assurance in High Education) for the domain: Engineering and Management.

Plenary Lecture 3

Energy Saving Projects and their Profitability Analysis

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Abstract: In the speech is presented some specific situations regarding the poor insulation of many buildings in Romania and their inadequate heating system and propose new solutions in order to improve these situations. The heating system, especially in apartment blocks, in the majority of cases, is designed as a vertical, different multi-columns solution of the heat distribution, meaning that one flat can have three, four or more heat supply columns. The individual consumption distribution is made, often, in function of the flats surfaces, which is, evidently, not in accordance with the real consumption. More than that, different flats can have different kind of radiators (heaters) not only as type, but also as size! As result, no cause to save energy long as nobody can take in account any action in this respect. Obviously, it is not useful to purpose a new solution which is not profitable. To know if it will be profitable, it is necessary to compare the implemented resources and the results obtained. The comparison between the investment cost and the sum of the anticipated incomes (after actualization) makes it possible to measure the profitability of a project. Generally, an investment is characterized by significant expenses over a relatively short period which generates later flows of incomes during all the lifetime of the investment. The economic profitability determination of the investment based on the calculation of the financial benefit carried out is debatable, especially because of the fuel (conventional) price level which intervenes in the calculation, and which reflection is not the level on the world market at a given time. The lecture introduces the determination of the energy recovery duration (energetic recovery time) using the annual energy saving (in conventional fuel in [kg /year] or in [kWh/year] and the energy incorporated in the products which constitute this installation, in [kg] or in [kWh].

Brief Biography of the Speaker:

• Engineer License degree obtained in 1974, at Faculty of Energetics, University “Politehnica" of Bucharest, ROMANIA;
• Master degree in “Gestion de PME-PMI” (SMEs management) obtained in 2001 at Faculte d'Administration et Echange, Universite Paris XII, Val de Marne, FRANCE ;
• From 1980 Professor (Department of Thermodynamics and Fluids Mechanics), University Transilvania of Brasov (teaching Thermodynamics, Renewable Sources of Energy, Energy Management, Heat and Mass Transfer Processes);
• PhD obtained in 1991 with the thesis "Optimization of Heat Pipe Heat Exchangers", (in Romanian);
• Participations at International Heat Pipe Conferences: Grenoble (France), Beijing (China), Tokyo (Japan), Albuquerque (U.S.A) at different WSEAS Conferences (HTE’07, HTE’08, URES ‘08) and IEEEAM Conference (ACS).

Plenary Lecture 4

Residential Areas - Key for Sustainable Development of Urban Areas in the Framework of Current Environmental Changes

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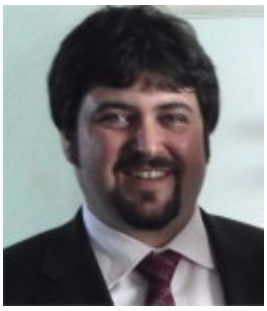
Abstract: Recent environmental changes determined significant complications in the relation between residential areas and other environmental components, determining an increase of the environmental costs necessary to maintain an acceptable quality of life.
The aim of the plenary session is to highlight the two dimensions of the residential areas, as generator and receiver of environmental problems, which are essential for the sustainable development of human settlements. This will be accomplished through the adjustment of administrative and legislative instruments aimed at promoting the eco-housing concept at global, national, regional and local level.
The importance of approaching this problem in the framework of sustainability is given by the fact that residential areas are the main receiving component for the environmental dysfunctions generated in human settlements. In the large urban areas, the population spends 40 to 60% of the time in residential areas. Knowing the quality of indoor and outdoor environment becomes essential for the health and welfare of the population and also for improving environmental quality at local, regional and global level.
At the same time, increasing aggression against the environment of consumption patterns adopted by the population, mainly related to physiological needs (food, shelter, water, security, hygiene) has led to diversification and amplification the role of residential areas in changing the quality of environment locally, regionally and even globally. Thus, from a receiving component of environmental dysfunctions caused by major sources of degradation, residential areas have become serious threats to environmental stability, but also for public health and comfort.
Residential areas are now domestic sources of degradation responsible for many environmental problems encountered at local, regional and global level (climate changes, acidification of the environment, degradation of the ozone layer, biodiversity degradation, poor management of dangerous products, water and air pollution), which are considered in developed countries as a separate component when evaluating the quality of the environment in a certain area.
The complexity of their approach comes from:
-diversity, which appears in the population and the urban structures;
-high fragmentation where domestic sources are not unitary, with homogeneous acting, being very scattered and random structures in terms of aggressiveness;
-impossibility in controlling environmental risks only through preventive and precautionary actions;
-limited resources of the administrative institutions, that are put in a position to firstly solve the social and economic problems;
-relating with other existing problems in society (conflicts, social segregation, economic problems, easy access to a proper shelter or to infrastructure and public services).
During the plenary session these ideas will be enhanced by many case studies from Europe, USA, China, India and South America.

Brief Biography of the Speaker:
Cristian IOJA is associate professor at the Faculty of Geography and researcher at Center for Environmental Research and Impact Studies, University of Bucharest. Since 2006 holds a PhD in Geography, with thesis Means and techniques for environmental impact assessment in Bucharest metropolitan area. His research activities are focused by environmental impact assessment of different territorial planning aspects (environmental impact assessment of residential areas from the urban areas, spatial analysis of environmental degradation sources in human settlements, evaluation of green areas recreational services, efficiency evaluation of Romanian protected areas network etc.).

These results published in 6 books, 3 invited book chapter and over 50 international scientific papers. The scientific activity and involvement has resulted also from participating in achieving local and regional plans of action for the environment of Bucharest and the Bucharest-Ilfov Development Region, 12 protected areas management plans and 11 master plans. Scientific studies have been completed theoretical and practical the teaching process by the seminars and practical work at the discipline Environmental Geography.

Plenary Lecture 5

Problems of Interaction between Operator and Artificial System (with a Special Focus on Vehicle Drivers)



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Abstract: The problem of reliability and safety of interaction between the driver (operator) and him controlled vehicle (machine) plays a crucial role in the overall safety in transport industry over the world. Most of the accidents happened due to the failure of human factor. This is often caused either by a bad design of the system (mainly its interface) or an insufficient or unsuitable training of the human operators.
The lecture introduces main topics of the Human-Machine Interaction (HMI) research field and problems of user interface in systemic point of view. These will be discussed in general, seamlessly moving towards the field of driver-vehicle interaction reliability and safety. Within the research work of the Laboratory of system reliability we have been focused on this research field for almost 15 years. The objective approaches to investigate in reliability of operator-machine interaction will be introduced as well as mathematical modeling tools. Beside those general approaches, the lecture will introduce in more detail our main research focus;on ergonomic and human factors in vehicle control.
Good part of the lecture will be dedicated to research tools – special interactive driving simulators, which are continuously being developed within the Driving Simulation Research Group. This covers not only simulation technology but also scenario/experiment design and mainly measurement tools and methods, which are fitted just for such kind of experiments. Indisputable role in this area is played by special measuring devices, especially so called psychophysiological ones. The data measured during such experiments are usually hard to be interpreted in straightforward way, mainly those which have biological nature. Therefore also some advanced analytical and classification tools will be discussed. Finally some recent interesting results and conclusions will be shown.