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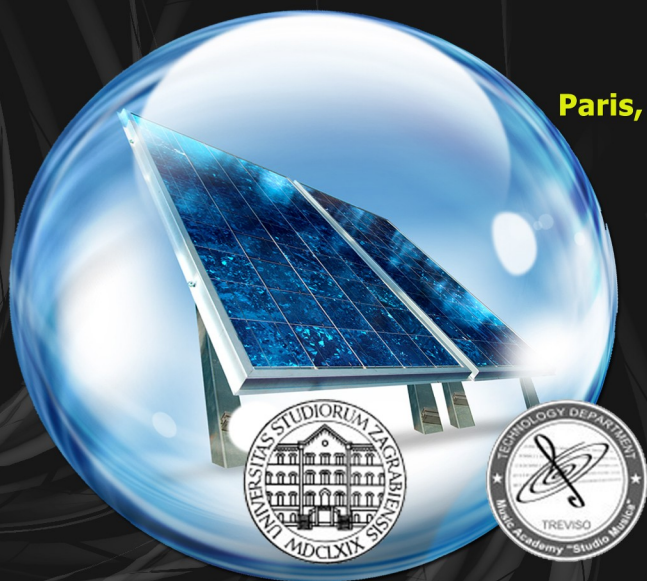
## **Recent Advances in Energy, Environment, Economics and Technological Innovation**



Proceedings of the 4<sup>th</sup> International Conference on  
Development, Energy, Environment, Economics (DEEE '13)

Proceedings of the 4<sup>th</sup> International Conference on  
Communication and Management in Technological Innovation  
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**Paris, France, October 29-31, 2013**



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# Table of Contents

<b><u>Plenary Lecture 1: An Event-Driven Method for Simulating Water Quality in Distribution Systems</u></b>	11
<i>Camelia Gavrilă</i>	
<b><u>Maximum Power Regime at Indicated Minimum Consumption for a Compression Ignition Engine Cycle</u></b>	13
<i>Ion Omocea, Marian Dordescu, Violeta Ciucur</i>	
<b><u>Determination of BTX Levels in Ambient air of One Urban Site Located at the Southwest of Mexico City during Spring 2013</u></b>	19
<i>J. G. Ceron-Breton, R. M. Ceron-Breton, M. Rangel-Marron, G. X. Villarreal-Sánchez, A. Y. Uresti-Gómez</i>	
<b><u>The Influence of Load on the Operating Mode of the Asynchronous Generator</u></b>	28
<i>Violeta Vali Ciucur, Omocea Ion</i>	
<b><u>Testing Method of Materials for Enthalpy Wheels</u></b>	34
<i>Tomáš Vít, Petr Novotný, Nguyen Van Vu, Václav Dvořák</i>	
<b><u>Comparative Study on the Spread of Petroleum Products on the Water Surface</u></b>	39
<i>Ionut Voicu, Fănel Viorel Panaitescu, Nicolae Valeriu Panaitescu, Mariana Panaitescu</i>	
<b><u>A Review of the Proposed Large-Scale Energy Storage Applications on the Autonomous Power System of Crete</u></b>	45
<i>Y. A. Katsigiannis, E. S. Karapidakis, A. G. Tsikalakis, A. Katsamaki</i>	
<b><u>Modeling and Simulation of Biological Anaerobic Treatment of Sludge Resulted from Wastewater Treatment</u></b>	55
<i>Aurel Presură, Lăcrămioara Diana Robescu, Ileana Irina Panaitescu</i>	
<b><u>Comparative Response of Lettuce (<i>Lactuca sativa</i>) to Inorganic and Organic Compost Fertilization</u></b>	61
<i>Mario Reis, Luisa Coelho, Jose Beltrao, Irina Domingos, Mario Moura</i>	
<b><u>Electrical Parameters in Distribution Network with Electric Vehicle Charger</u></b>	69
<i>Peter Janiga, Martin Liška, Dominik Viglaš, Boris Cintula</i>	
<b><u>Applications of GRASP Metaheuristic Algorithm in Solving Cutting and Packing Problems</u></b>	73
<i>Simona Dinu, Andrei Gabriela</i>	
<b><u>A Note on GARCH(1,1) Estimation via Different Estimation Methods</u></b>	81
<i>Peter Princ, Václav Školuda</i>	
<b><u>Management of Wind Energy in Sustainable Development Process in the Central Dobrogea (Istria Region)</u></b>	86
<i>Simona Ghiță, Andreea Diana Buhociu, Nicoleta Acomi</i>	



<b><u>Applying DEMATEL Method to the Study on Sustainable Management of Low-Carbon Tourism for Cultural Heritage Conservation</u></b>	96
<i>Kuei-Yang Wu, Ming-Jie Zheng, Shih-Chung Lu, Yen-Yu Wu</i>	
<b><u>Combined Effects of Nitrogen and Potassium Mineral Fertilization on Bermuda Turfgrass (<i>Cynodon dactylon</i> L.) Quality, Irrigated with Different Wastewater Levels</u></b>	103
<i>Rui Santos, Manuel Costa, Jose Beltrao, Pedro Jose Correia</i>	
<b><u>Distribution of Zooplankton Populations Entrained by the Nuclear Power Plant Cernavoda Cooling Water System</u></b>	116
<i>Mirela-Iuliana Sundri</i>	
<b><u>Demonstration of the Use of CGE Model for Comparative Analysis of European Economies</u></b>	122
<i>Vaclav Skoluda, Peter Princ</i>	
<b><u>Emerging Aspects Regarding the Analysis of the Performance of Diversified Portfolios in Emerging Markets - The Case of Bucharest Stock Exchange</u></b>	131
<i>Stelian Stancu, Mircea Boşcoianu, Alexandra Maria Constantin, Cristian Bordea, Calin Ciufudean</i>	
<b><u>The Use of DEA Techniques in the Assessment of Intellectual Capital</u></b>	135
<i>Simona Dinu, Madalina Nitoiu</i>	
<b><u>Experimental Studies with the Salty Water of Techirghiol Lake</u></b>	141
<i>Panaiteescu Mariana, Memet Feiza, Mitu Daniela-Elena, Panaiteescu Ileana-Irina</i>	
<b><u>Secondary Regulation Now and Future</u></b>	145
<i>Gabriela Ungureanu, Gheorghe Lazaroiu, Emil M. Oanta, Cornel Panait</i>	
<b><u>Social Networks – A Modern Form of Online Advertising in the Worldwide Economic Crisis</u></b>	151
<i>Simona Dinu, Madalina Nitoiu</i>	
<b><u>Introducing the Financial Brand Impact Adjustor in the VIM Model for Appraising the Brand of an Unlisted Company</u></b>	157
<i>Tomáš Krabec, Romana Čížinská</i>	
<b><u>About Ecological Technologies Applicability in Closed and Open Spaces</u></b>	163
<i>Panaiteescu Fanel-Viorel, Panaiteescu Mariana, Deleanu Dumitru</i>	
<b><u>Dimensioning of the Operating Reserves in Systems with Wind Power Generation</u></b>	169
<i>Oana Udrea, Gheorghe Lazaroiu, Emil M. Oanta, Cornel Panait</i>	
<b><u>The Energy Efficiency Operational Index – An Instrument for the Marine Pollution Control</u></b>	177
<i>Nicoleta Acomi, Ovidiu Cristian Acomi, Simona Ghiță</i>	

<b><u>Determining the Air-Conditioners Placement in Order to Obtain the Indoor Optimum Temperature</u></b>	181
<i>Catalina Raluca Mocanu, Liviu Constantin Stan, Ileana Irina Panaitescu, Liviu Valentin Balanescu</i>	
<b><u>Selectivity and Coordination of Protection Systems for an Effective Smart Grid Reconfiguration</u></b>	187
<i>Francesco Muzi, Zagdkhorol Bayasgalan</i>	
<b><u>Statistical Calculus of Mud Effectiveness from Techirghiol Lake</u></b>	192
<i>Panaitescu Mariana, Memet Feiza, Mitu Daniela, Panaitescu Ileana-Irina</i>	
<b><u>Reliability Analysis of Water Distribution Systems</u></b>	198
<i>Camelia Gavrilă, Andreea Vartires, Ion Gruia, Florinela Ardelean</i>	
<b><u>Analysis of Drought Phenomenon Using Remote Sensing Data in Romania</u></b>	204
<i>A. T. Nertan, M. Panaitescu, Gh. Stancalie, A. Irimescu, C. Flueraru, V. Panaitescu</i>	
<b><u>Clean LNG Fuel for Black Sea-Danube-Rhine Corridor</u></b>	214
<i>Sagau Mihai</i>	
<b><u>VAT and Improving its Performance</u></b>	220
<i>Beáta Blechová, Jana Janoušková, Šárka Sobotovičová</i>	
<b><u>Ocean Waves Hydro-Electric Power Station Using a Gravitational Electrical Generator on Magnetic Fluid Cushion</u></b>	226
<i>Nicolae Calin Popa, Ali Siblini, Jean Jacques Rousseau, Nicolae Crainic</i>	
<b><u>Readiness of the Marketing Managers to Address and Solve Issues of Current Marketing</u></b>	231
<i>Martina Jurikova, Olga Juraskova, Leona Tolarová</i>	
<b><u>A Point of View on Efficiency and Innovation in Refrigeration</u></b>	237
<i>Memet Feiza, Mitu Daniela Elena, Mariana Panaitescu</i>	
<b><u>Special Characteristics of the Singles Segment in the Czech Republic and Its Brand Relationships</u></b>	242
<i>Martina Juříková, Olga Jurášková, Pavla Kotyzová, Josef Kocourek</i>	
<b><u>European Union Initiatives for the Development of Sustainable and High-Quality Tourism in Europe</u></b>	252
<i>Grațîela Brânză</i>	
<b><u>Exploring Intercultural Competence through Perceived Social Distance: Business School Students in Croatia</u></b>	256
<i>Iva Sedlic, Masha Magzan, Andrijana Musura</i>	
<b><u>Telemedicine Based Globalization</u></b>	263
<i>Mihaela Hnatiuc, Cătălin J. Iov</i>	

<a href="#"><u>Economic Aspects of Transport Pricing Policy in European Union</u></a>	270
<i>Grațiera Brânză</i>	
<a href="#"><u>Authors Index</u></a>	274

## Plenary Lecture 1

### An Event-Driven Method for Simulating Water Quality in Distribution Systems



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**Abstract:** In the Event-Driven Method (EDM) the time-varying water quality problem is simulated in an event-oriented environment. In this environment, the contaminant-transport process is driven by the distribution-system activities. Basically, the EDM creates, identifies, and places (removes) events –which can be hydraulic or sub-hydraulic –, into or from an activity list in a chronological order. It is assumed that the initial constituent concentration at every junction node is zero. Since the only factors affecting the concentration at any node are the concentrations and flows in the pipes immediately upstream of the given node, the only information that must be available during any point in the simulation are the different pipe segment concentrations. A sub-hydraulic event takes place whenever a water front with a different constituent concentration reaches a node. To each pipe we dynamically assign records called “seps” (there may be more than one per pipe). Their function is to serve as separators between volumes of water with different concentrations. When a relatively large number of seps are simultaneously active, a partial aggregation of the “seps” may be performed (using the Gauss formula with Legendre polynomial of second degree). The performance of the proposed method is demonstrated by applying it to an example water-distribution network. The main advantage of this method is that it allows a dynamic modeling of the water-quality, which is less sensitive to the structure of the network and to the length of the simulation process itself. In addition, the numerical dispersion of contaminant-concentration resolution is nearly eliminated. The method can be used for all network configurations and for all dynamic hydraulic conditions, and has been shown to exhibit excellent convergence characteristics.

**Brief Biography of the Speaker:** Dr. Camelia GAVRILA holds a BSc in Mathematics from the University of Bucharest, Faculty of Mathematics, Romania and a Ph.D. in Civil Engineering (2003) from the Technical University of Civil Engineering Bucharest, Romania. Since 2005 she is associate professor at the Thermal-Hydraulic Systems and Atmosphere Protection Department of the Technical University of Civil Engineering, Bucharest, Romania. She has ISI publications in the Optoelectronics and Advanced Materials–Rapid Communications, SPIE journals, Chemistry Magazine, Proceeding Conference IEEE. She has research agreements and projects in the field of: Identification Methods for Nonlinear System; Numerical Methods for solving PDE's: finite difference method, discrete volume method, finite element method; Modelling Water Quality; Environment Protection; Optics and Lasers; Abel Modelling; Modelling and Simulation with COMSOL Multiphysics. Assoc. Prof. Dr. GAVRILA is a member of several professional bodies: The Romanian Association of Water (ARA), The International Water Association (IWA), IEEE, SPIE, OSA.