



Editors: Nikos Mastorakis, Valeri Mladenov,  
Metin Demiralp, Zoran Bojkovic



# Advances in Biology, Bioengineering and Environment

Advances in Biology, Bioengineering and Environment



- ☞ 6<sup>th</sup> WSEAS International Conference on Cellular and Molecular Biology, Biophysics and Bioengineering (BIO '10)
- ☞ 8<sup>th</sup> WSEAS International Conference on Environment, Ecosystems and Development (EED '10)
- ☞ International Conference on Bioscience and Bioinformatics (ICBB '10)

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(BIO '10)**

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**Preface**

This year the 6th WSEAS International Conference on CELLULAR and MOLECULAR BIOLOGY, BIOPHYSICS and BIOENGINEERING (BIO '10), the 8th WSEAS International Conference on ENVIRONMENT, ECOSYSTEMS and DEVELOPMENT (EED '10) and the International Conference on Bioscience and Bioinformatics (ICBB '10) were held in Vouliagmeni, Athens, Greece, December 29-31, 2010. The conferences remain faithful to their original idea of providing a platform to discuss biology of cell, metabolism, molecular biology, bioengineering, computer biology, genetics, hydrology, geology and geoinformatics, urban development, energy, biodiversity, city planning, rural development, waste management, transportation, biotechnology, cognitive biometrics, immunological studies, computational physiology, radiobiology, electrophysiology etc. with participants from all over the world, both from academia and from industry.

Their success is reflected in the papers received, with participants coming from several countries, allowing a real multinational multicultural exchange of experiences and ideas.

The accepted papers of these conferences are published in this Book that will be indexed by ISI. Please, check it: [www.worldses.org/indexes](http://www.worldses.org/indexes) as well as in the CD-ROM Proceedings. They will be also available in the E-Library of the WSEAS. The best papers will be also promoted in many Journals for further evaluation.

Conferences such as these can only succeed as a team effort, so the Editors want to thank the International Scientific Committee and the Reviewers for their excellent work in reviewing the papers as well as their invaluable input and advice.

The Editors





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## Plenary Lecture 1

### The Application of External Magnetic Stimulation for Treatment of Parkinson's Diseased Patients



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**Abstract:** The aim of the this study was to investigate the influence of external transcranial magnetic stimulation (TMS) in parkinson's diseased (PD) patients using a whole-head 122-channel magnetometer SQUID and Fourier statistical analysis. The examined group consisted of 20 patients (12 males and 8 females; mean age 65 years: range 49-80 years) The TMS was in the order of pico Tesla(pT) and was applied on the above patients with proper field characteristics, which were obtained prior to TMS(magnetic field amplitude: 1-7.5pT, frequency: the a -rhythm of the patient:8-13Hz).

The MEG recordings after the application of TMS was shown a rapid attenuation of the high abnormal activity by an increase of the a-rhythm. The patient's responses to the TMS were a feeling of relaxation and partial or complete disappearance of tremor, muscular ache and levodopa induced dyskinesias as well as rapid reversed visuospatial impairment, which were followed by a corresponding improvement and normalization ot the MEG.

**Brief Biography of the Speaker:** Prof. P.Anninos is Emeritus Prof. of Medical Physics in the Department of Medicine of Democritus University of Thrace, Alexandroupolis, Greece after serving there as a Professor of Medical Physics for many years. His research interests concern Theoretical neural models, experimental Neurophysiology with emphasis in MEG measurements using SQUID's and the use of pTMS(picoTesla Transcranial Magnetic Stimulation) in patients with CNS disorders.

He has published more than 200 scientific papers in reviewed journals and have written several books in his field. He is a scientific reviewer for several international Journals.

## Plenary Lecture 2

### Numerical Simulation of Some Ecological Problems of Georgia for Risk Assessment



#### Professor Teimuraz Davitashvili

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**Abstract:** The Transport Corridor Europe-Caucasus-Asia (TRACECA) using railways, highways and oil-gas-pipelines, is conveyed oil, gas, coal and cotton, across Georgia from central Asia and Azerbaijan to other countries. At Present there are already functioning six main oil and gas transportation lines on the territory of Georgia. According to the experience of transit countries the convey of oil and gas by railway and pipelines causes great losses regarding the ecological situation thus counteracting the intended political and economical benefits. In addition to ordinary pollution of the environment it is possible that non-ordinary situations like pipeline and railway accidents arise. As foreign experience with pipelines shows, the main reasons of crashes and spillages are the destruction of pipes as a result of corrosion, defects of welding and natural phenomena (floods, landslides, earthquakes et. c). Also terrorist attacks and sabotage may occur.

It is obvious that safety of the neighbourhood of oil and gas pipelines is an urgent problem for many countries and for the Caucasus. The TRACECA routes crosses a multitude of surface water flows. Ground water along the route is also abundant and generally of high quality. In Georgia there are frequent cases, when flooded river undermines the bridges, bases and sometimes even take away the bridges. So eventually it can happen the erosion of the soil, decreasing to the minimum of the protective layer of the soil, damaging of the protective coverage of the pipeline by the broken stones brought by the flooded river, and leakage of the oil. In addition, if we take into account, that Georgia is placed in the seismically active zone, it increases the possibility of getting of the spilled oil on soil, surface and under-surface waters and in the rivers. As oil transportation by TRACECA and pipelines goes through the densely populated areas, so for solving the problem of protecting the population and the environment the important subject is the prognosis and modeling of possible emergency situations. So with the help of numerical integration of nonlinear filtration equation of a liquid, we have studied a penetration of oil into the rivers, soils underground water in case of their emergency spilling.

In the present work we have investigated the hydrological specifications of Georgian rivers. By Numerical model we have calculated Georgian the largest rivers Mtkvari's and Rioni's possible pollution by oil in the period of flooding. With the purpose of to study under ground water pollution by oil, oil penetration into soil with flat surface containing pits and slopping surface are studied by numerical modeling. Some analytical and numerical solutions of the diffusion and filtration equations are given and analyzed. Results of numerical calculations of oil propagation in soil under high pressure and possible under-surface water pollution earthquake dangerous regions of Georgia also are presented.

The problem of the forthcoming climate change resulting from natural and growing anthropogenic factors acquires a particular importance for Georgia. Georgia's climate oscillates from subtropical conditions on the Black Sea coast to continental conditions, with cold winters and hot summers, in the extreme east, with dry lands. The result of such a diversity of Georgian climate is that the statistical processing of the data of mean climatic temperature of the last ninety years exposed the regularity of the climate cooling in the West Georgia and warming in the East Georgia. There were also elicited those micro-regions where mean climatic temperature does not change in time.

In the present paper the specific properties of regional climate cooling process in the Western Georgia is studied by mathematical modelling. The effect of thermal and advective-dynamic factors of atmosphere upon the changes of the West Georgian climate is investigated. The specific peculiarities of the thermodynamic model of desertification

process are discussed. Some recommendations for halting the desertification process and restoration of soil active layer are given.

**Brief Biography of the Speaker:** Teimuraz Davitashvili, born in 1949, graduated from Tbilisi State University (TSU) in 1972, receiving the 5 years Diploma in Mathematics, specialization Hydro-air Mechanics. In 1985 he received the Ph.D and in 1997 the Doctor of Physics and Mathematics upon the doctoral thesis „ Numerical Modelling of Some Problems of Atmosphere Physics for Mountain Regions“. Since 1972 researcher, senior researcher, head of department, head of laboratory „Mathematical Modelling and Numerical Analyses“ at I.Vekua Institute of Applied Mathematics of TSU. 1994-1998 Assoc.Prof. of TSU, 1999-2006 Full Prof. of TSU. Since 2006 head of department „Weather Forecast , Modelling of Natural and Tegnogen.Catastrophic Events“ at the Hydrometeorological Institute of Georgia. He published 1 book, more then 100 research papers in various scientific journals and international conference proceedings. His general research interests are: applied mathematics, numerical modelling, environmental pollution, numerical methods of weather forecast.



## Plenary Lecture 3

### Cliques, Quasi-Cliques and Clique Partitions in Graphs



#### **Professor Panos M. Pardalos**

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**Abstract:** Given a graph, the maximum clique problem asks for a clique of maximum cardinality. Computationally equivalent problems are the maximum independent set problem and the minimum node cover problem. During the last decade, many problems in social, biological, and financial networks require finding cliques, or quasi-cliques. Cliques or clique partitions have also been used as clustering or classification data mining tools in data sets represented by networks. These networks can be very large and often massive and therefore external (or semi-external) memory algorithms are needed. We discuss applications, exact algorithms, heuristics, and computational approaches for all types of problems.

**Brief Biography of the Speaker:** Dr. Panos Pardalos is Distinguished Professor of Industrial and Systems Engineering at the University of Florida. He is also affiliated faculty member of the Computer Science Department, the Hellenic Studies Center, and the Biomedical Engineering Program. He is also the director of the Center for Applied Optimization. Dr. Pardalos obtained a PhD degree from the University of Minnesota in Computer and Information Sciences. He has held visiting appointments at Princeton University, DIMACS Center, Institute of Mathematics and Applications, FIELDS Institute, AT&T Labs Research, Trier University, Linköping Institute of Technology, and Universities in Greece. He has received numerous awards including, University of Florida Research Foundation Professor, UF Doctoral Dissertation Advisor/Mentoring Award, Foreign Member of the Royal Academy of Doctors (Spain), Foreign Member Lithuanian Academy of Sciences, Foreign Member of the Ukrainian Academy of Sciences, Foreign Member of the Petrovskaya Academy of Sciences and Arts (Russia), and Honorary Member of the Mongolian Academy of Sciences. Dr. Pardalos received the degrees of Honorary Doctor from Lobachevski University (Russia) and the V.M. Glushkov Institute of Cybernetics (Ukraine), he is a fellow of AAAS, a fellow of INFORMS, and in 2001 he was awarded the Greek National Award and Gold Medal for Operations Research. Dr. Pardalos is a world leading expert in global and combinatorial optimization. He is the editor-in-chief of the Journal of Global Optimization, Journal of Optimization Letters, and Computational Management Science. In addition, he is the managing editor of several book series, and a member of the editorial board of several international journals. He is the author of 8 books and the editor of several books. He has written numerous articles and developed several well known software packages. His research is supported by National Science Foundation and other government organizations. His recent research interests include network design problems, optimization in telecommunications, e-commerce, data mining, biomedical applications, and massive computing. Dr. Pardalos has been an invited lecturer at many universities and research institutes around the world. He has also organized several international conferences.

## Plenary Lecture 4

### Pedestrian Circulation Safety Needs and Opportunities in Greek Cities



#### **Professor Eleni Stamatiou**

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Dr. Town and Regional Planner

Professor-Consultant at the Hellenic Open University

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**Abstract:** This presents the historical retrospection and the international experience, the operation of circulation in the city, questions of circulatory safety and free access, citizens with moving disabilities (elderly, handicap, pregnant, parents with children, etc.), in designing models (heights of pavements, "of pavements with indicators" individuals with sight disabilities of pavements, endings of pavements, crossings of pedestrians, ramps for access in public spaces, spaces of quartering of the disabled, foot walk, accesses in public means of mass transport, etc), legislative forecasts and needs, the international and European Community legislation., the administrative pathogen behavior and problems relative to the application of these rules and violations of legislation, infringements and identification of problems, the role of state and local self-government, examples from overseas, arising needs and proposals for improvement and further exploitation.

**Brief Biography of the Speaker:** Dr Eleni N. Stamatiou, Architect-Engineer NTUA, MSc Regional Development, Dr. in Town & Spatial Planning (PHD, PPHD). Completed her studies with Scholarships of the Greek State (IKY). Professional Experience (since 1989), Scientific, Teaching and Research Experience (since 1997) from overseas and in Greece (Assoc Professor at the University of Thessaly, Professor-Consultant at the Hellenic Open University / Post Graduate program, National School of Public Administration, etc.), Vice President of the Greek Regionalists Association(OA?).

She has lectured at several Greek Universities (National Technical University of Athens, Harokopeio University, National School of Public Administration, etc.) and was invited to speak in several overseas Universities (in France, Russia, U.K. and USA) has been and continues to oversea Masters and Doctors degrees in addition to being a member of the professors exams committee (National School of Public Administration, Hellenic Open University, etc.). She has taught numbers of training seminars to adults with a degree, for higher company and Ministerial executives etc. She has overseen and published several books and published articles in Greek, English, Russian and French. Member of the Editorial Board of scientific publications and journals. Participation and co-authorship in the creation of university graduate study programs. Member of Greek, French, European and International Associations (UIA, SFA, ECTP, ERSa, etc.). Fundamental and instrumental active participation in International scientific committees in Europe and the USA (INRECON, ENVIRON, etc.). Member of Scientific organizations and representative for Greece in International forums and programs (with the Russian Research Institute of Land Planning, The Russian Academy of Social Sciences, etc.). Co-editor and session-chief in International conferences of the Greek Regionalists Association. National Representative for Greece of OAAAO (Association of Greek Architects) at the European Council of Architects (ACE) / "Urban issues". Participation as principal member of scientific organizations and committees (Evaluation of European town-planning awards ECTP, etc.). Member of work groups, Member of the Permanent Arbitration Committee (2006-2007) and Domain Expert of the Technical Chamber of Greece (OAA). Her Scientific and professional Interests concern subjects of architecture, spatial and regional planning and related legislation, regional development, environmental management, cultural and built environment, sustainable development, etc., these principles she applied and promoted successfully throughout her professional career through her many held managerial positions (as member of the board, senior scientist, etc.). She is married to the IT Consultant / International Researcher Richard-Nicolas LACROIX and they have two sons.