NORTH ATLANTIC UNIVERSITY UNION

Editors: Valeri Mladenov, Kleanthis Psarris, Nikos Mastorakis,
Amauri Caballero, George Vachtsevanos

Advances in Control, Chemical Engineering, Civil Engineering & Mechanical Engineering

European Conference of Chemical Engineering (ECCE '10)
European Conference of Civil Engineering (ECCIE '10)
European Conference of Mechanical Engineering (ECME '10)
European Conference of Control (ECC '10)

Puerto De La Cruz, Tenerife, November 30 - December 2, 2010

PRINT VERSION ISSN
ISSN: 1792-6645
ISSN: 1792-6661
ISSN: 1792-6726
ISSN: 1792-6688

ELECTRONIC VERSION ISSN
ISSN: 1792-6750
ISSN: 1792-6777
ISSN: 1792-6831
ISSN: 1792-6793

ISBN: 978-960-474-251-6

Advances in Control, Chemical Engineering, Civil Engineering & Mechanical Engineering

ADVANCES in CONTROL, CHEMICAL ENGINEERING, CIVIL ENGINEERING and MECHANICAL ENGINEERING

European Conference of Chemical Engineering (ECCE '10)
European Conference of Civil Engineering (ECCIE '10)
European Conference of Mechanical Engineering (ECME '10)
European Conference of Control (ECC '10)

Puerto De La Cruz, Tenerife
November 30-December 2, 2010

Published by WSEAS Press
www.wseas.org

PRINT VERSION:
ISSN: 1792-6645
ISSN: 1792-6661
ISSN: 1792-6726
ISSN: 1792-6688
ISBN: 978-960-474-251-6

ELECTRONIC VERSION:
ISSN: 1792-6750
ISSN: 1792-6777
ISSN: 1792-6831
ISSN: 1792-6793

ADVANCES in CONTROL, CHEMICAL ENGINEERING, CIVIL ENGINEERING and MECHANICAL ENGINEERING

European Conference of Chemical Engineering (ECCE '10)
European Conference of Civil Engineering (ECCIE '10)
European Conference of Mechanical Engineering (ECME '10)
European Conference of Control (ECC '10)

Puerto De La Cruz, Tenerife, November 30-December 2, 2010

Published by WSEAS Press
www.wseas.org

Copyright © 2010, by WSEAS Press

All the copyright of the present book belongs to the World Scientific and Engineering Academy and Society Press. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of the Editor of World Scientific and Engineering Academy and Society Press.

All papers of the present volume were peer reviewed by two independent reviewers. Acceptance was granted when both reviewers' recommendations were positive.
See also: http://www.worldses.org/review/index.html

PRINT VERSION:	ELECTRONIC VERSION:
ISSN: 1792-6645	ISSN: 1792-6750
ISSN: 1792-6661	ISSN: 1792-6777
ISSN: 1792-6726	ISSN: 1792-6831
ISSN: 1792-6688	ISSN: 1792-6793
ISBN: 978-960-474-251-6	

North Atlantic University Union

ADVANCES in CONTROL, CHEMICAL ENGINEERING, CIVIL ENGINEERING and MECHANICAL ENGINEERING

European Conference of Chemical Engineering (ECCE '10)
European Conference of Civil Engineering (ECCIE '10)
European Conference of Mechanical Engineering (ECME '10)
European Conference of Control (ECC '10)

Puerto De La Cruz, Tenerife
November 30-December 2, 2010

Editors:
Prof. Valeri Mladenov, Technical University of Sofia, BULGARIA
Prof. Kleanthis Psarris, University of Texas at San Antonio, TX, USA
Prof. Nikos Mastorakis, Technical University of Sofia, BULGARIA
Prof. Amauri Caballero, Florida International University, Miami, FL, USA
Prof. George Vachtsevanos, Georgia Institute of Technology, Atlanta, GA, USA

International Program Committee Members:
Ronald Yager, USA
Amauri Caballero, USA
George Vachtsevanos, USA
Robert Finkel, USA
Demetrios Kazakos, USA
Theodore Trafalis, USA
Takis Kasparis, USA
Zhiqiang Gao, USA
Yan Wu, USA
Spyros Tragoudas, USA
Arkady Kholodenko, USA
Gregory Baker, USA
Galigekere Dattatreya, USA
Caroline Sweezy, USA
Asad Salem, USA
Dian Zhou, USA
Metin Demiralp, TURKEY
Olga Martin, ROMANIA
Panos Pardalos, USA
Constantin Udriste, ROMANIA
Kleanthis Psarris, USA
Andrew D. Jones, USA
Valeri Mladenov, BULGARIA
Neri F., ITALY
Chen S. Y., P. R. CHINA
Shyi-Ming Chen, R. O. C.
Yen K., USA
Rong-Jyue Fang, TAIWAN
Argyrios Varonides, USA
Nikolai Kobasko, USA
Xu Anping, P. R. CHINA
Zhu H., JAPAN

Table of Contents

Keynote Lecture 1: Cognitive Engineering & Religious Emotions: A Mathematical Equivalence of Dynamics and Teleology 11
Leonid Perlovsky

Structural Robust Design Optimization of Steel Frames with Engineering Knowledge-Based Variance-Reduction Simulation 13
David Greiner, Jose M. Emperador, Blas Galvan, Gabriel Winter

Experimental Stress Analysis on a Wagon Model for Railway Vehicles 19
T. St. Manescu, N. L. Zaharia, M. D. Stroia, S. D. Avram, M. N. Tiganasu

One-Room Fire Models Analysis 22
T. Manescu, E. M. Afronie, M. D. Stroia, A. I. Chivu, T. Manescu Jr., F. Pomoja

Designing Method for Stamps used in Automotive Parts Manufacturing 25
S. D. Avram, M. D. Stroia, M. N. Tiganasu, T. St. Manescu

Influence of Polymers on Concrete Damping Properties 28
S. F. Nabavi

Mathematical Modeling of Material Removal Rate for Ti-5Al-2.5Sn through EDM Process: A Surface Response Method 34
M. M. Rahman, Md. Ashikur Rahman Khan, K. Kadirgama, M.M. Noor, Rosli A. Bakar

Ion Plating Process of Applying Thin Layers 38
Ciprian Manescu, Ionita Gheorghe, Carmen Popa, Ivona Petre

Mathematical Aspects in Determining the Configuration of the Coaxial Coupling Between a Circular and a Polygonal Section 41
Ivona Petre, Alin Pohoata, Carmen Popa

Methods for Determining the Unfolding of the Constructions Used in Industrial Installations 46
Carmen Popa, Stefania Iordache, Ivona Petre, Magda Gabriela Bratu, Ciprian Manescu

Minimization by FEM of the Transient Electrical Contact Resistance and Contact Temperature of Power Automotive Connector 50
Amine Beloufa

Influence of Ligand Exchange on the Structural and Optoelectronic Properties of CdSe Nanocrystals 59
Nguyen Tam Nguyen Truong, Chinho Park

Real-Time Control of Electron Density in Low Pressure Plasma 63
Yang Zhang, Anthony Holohan, Bernard Keville, Stephen Daniels

Radiative Entropy Generation in a Cylindrical Enclosure 67
F. Ben Nejma, A. Mezgar, K. Charrada

Properties of Fiber Reinforced Concrete Using Recycled Aggregates 71
V. Vytlacilova, J. Vodicka

Effects of Isolation Damping and Stiffness on the Seismic Behaviour of Structures 76
A. Abrishambaf, G. Ozay

Engineering on the Nanoscale: Enrichment and Separation of Elements Using Membrane-Based Technologies 82
Kurt E. Geckeler

Reverse Micellar Synthesis, Characterization & Antibacterial Study of Nickel Nanoparticles 88
Harish Kumar, Renu Rani, Rajkumar Salar

Fuzzy Linear Multi-objective Programming 95
Said. Davar, Said. Ghasrodashti

Porous Iron and Ferric Oxide Pellets for Hydrogen Storage: Texture and Transport Characteristics 99
Karel Soukup, Jan Rogut, Jacek Grabowski, Marian Wiatowski, Magdalena Ludwik-Pardala, Petr Schneider, Olga Solcova

Control of Chaos in Nonlinear Gyros Via Optimal Backstepping Method 104
A. R. Khalilzadeh, M. Taleb Ziabari

An Intelligent Controller For A Single Link Flexible Joint Manipulator 109
A. R. Khalilzadeh, M. Taleb Ziabari

Sorption Isotherms of Mango (Mangifera Indica L.) Pulp Freeze-dried. 114
Rangel–Marron M., Welti–Chanes J, Cordova–Quiroz A. V., Ceron-Breton J. G., Anguebes–Franseschi F., Moreno-Martinez V.

Studies on Optimization of Withdrawing Cylinder at Vertical Continuous Casting of Steel 119
M. Tufoi, I. Vela, C. Marta, D. Amariei, A. I. Tuta, C. Mituletu

Analysis on the Operation of Gas Regulators and Optimization of their Operation 125
A. I. Tuta, I. Vela, M. Tufoi, D. Amariei, C. Mituletu, L. Suciu

Control Lorenz Chaos Using Optimal Backstepping Method 131
A. R. Khalilzadeh, M. Taleb Ziabari

Removal of CO2 from Gas Mixture Using Hollow Fiber Membrane Contactors Fabricated from PVDF/Triacetin/Glycerol Cast Solution 136
N. Ghasem, M. Al-Marzouqi, R. Al-Marzouq, A. Dowaidar, M. Vialatte

Mobile Robots Navigation Based on Graph Search Techniques 142
Radu Robotin, Petru Dobra, Gheorghe Lazea

Modeling and Simulation of Autonomous Logistic Processes 148
Bernd Scholz-Reiter, Daniel Rippel, Steffen Sowade

Cold Rolling Shape Defects of Stainless Steel Wide Strips 154
Chiran Andrei, Moisa Bogdan, Nicolescu Georgian, Priceputu Ionut, Bacinschi Zorica

Stainless Steel the Environment Friendly Choice 159
Moisa Bogdan Alexandru, Chiran Andrei, Constantin Marian, Bacinschi Zorica, Rizescu Cristiana Zizi, Stoian Elena Valentina

Phase Field Theory Modeling of CH4/CO2 Gas Hydrates in Gravity Fields 164
M. Qasim, B. Kvamme, K. Baig

Two-and Three-dimensional Organization of Gold Nanoparticles 168
Toyoko Imae, Shoichi Ohishi, Masaki Ujihara

Predicting of Minimum Fluidization Velocity of a Binary Density System Using Pressure Fluctuation in a Fluidized Bed 172
Rafail L. Isemin, Alex V. Mikhalev, Dmitry M. Viryasov, Sergey N. Kuzmin

Intelligent Control and Modelling of a Micro Robot for In-pipe Application 176
Y. Sabzehmeidani, M. Mailah, M. Hussein, A. R. Tvakolpour, M. R. Safizadeh

Creep of Cement Paste Preloaded by High Temperature 182
P. Padevet, P. Bittnar

Kinematic Analysis of an Assistive Robotic Leg for Hemiplegic and Hemiparetic Patients 188
M. R. Safizadeh, M. Hussein, K. F. Samat, M. S. CheKob, M. S. Yaacob, M. Z. MdZain, Y. Sabzehmeidani

Time Dependence of Mechanical Properties of Specimens Made from "Grey Gypsum" 195
P. Padevet, P. Tesarek, T. Plachy

Assessment of the Depth of Anaesthesia in Animals for Automatic Control 201
B. A. Costa, R. Figueiredo, J. M. Lemos, A. Silva, S. Campos, L. Antunes

Optimization of the Parameters for Galvanic Deposition of Silver/Diamond Dispersion Coatings 206
I. V. Rigou, G. Marginean, C. V. Campian, D. Frunzaverde, W. Brandl

Characteristics of Aerodynamics Forces Acting on Two Square Cylinders in the Streamwise Direction and its Wake Patterns 209
A. Etminan, M. Moosavi, N. Ghaedsharafi

Mixed H2 and Hinfinoty Performance Analysis of Networked Control Systems with Fading Communication Channels 218
Adrian-Mihail Stoica

Smart Gun with Implantable RFid Match System - A practical approach 223
Gazziro M. A., Almeida L. O. B., Pedrazzani C. D., Machado C. G. C. F.

Effect of Deposition Temperature on the Crystalline Structure and Surface Morphology of ZnO Films Deposited on p-Si 227
Seval Aksoy, Yasemin Caglar, Saliha Ilican, Mujdat Caglar

Characterization of a Multilayer GaAs/AlGaAs Broadband Quantum Well Infrared Photodetectors 232
Hulya Kuru, Burcu Arpapay, Tugce Karakulak, Bulent Arkan, Bulent Aslan, Ugur Serincan

Electrochromic Nanocomposite of Silica/Polyaniline Prepared from a Water-In-Oil Microemulsion Solution 236
Taejin Hwang, HeungYeol Lee, Hohyeong Kim, Gyuntak Kim

An Approximate Solution Corresponding to a Quasi-Stationary State during Nitriding 241
J. L. Bernal, F. Castillo, J. Oseguera, A. Fraguela, A. Medina, L. Bejar, A. Barranon, A. Juanico

Authors Index 249

Keynote Lecture 1

Cognitive Engineering & Religious Emotions: A Mathematical Equivalence of Dynamics and Teleology

Dr. Leonid Perlovsky
Visiting Scholar, Harvard University
33 Oxford St, Rm 336, Cambridge MA 02138
Principal Research Physicist and Technical Advisor
Air Force Research Laboratory 80 Scott Drive, Hanscom AFB, MA 01731-2909
AFRL: Tel. 781-377-1728; Fax 781-377-8984; Leonid.Perlovsky@hanscom.af.mil
Harvard: Tel. 617-496-1339; 617-495-7871; leonid@seas.harvard.edu

Abstract: The talk discusses a mathematical theory for cognitive engineering, which significantly improves solutions of many engineering problems and at the same time models spiritual feelings in the human brain-mind. This convergence of scientific, engineering, and religious theories indicates a possibility of signal developments. C. Jung wrote that schism between science and religion points to a psychosis of contemporary collective psyche; survival of culture demands repairing of this schism. Many outstanding scientists are trying to mend this schism. Many books are written arguing that the newest scientific discoveries in molecular biology, evolution, and cosmology do not contradict the main tenets of the world's religions. But there is no scientific theory, explaining spiritual dimension of the mind-brain. "Every one who is seriously involved in the pursuit of science becomes convinced that a spirit is manifest in the laws of the Universe." This Einsteinian statement remains outside of science. Understanding of the mind mechanisms today came close to explaining spirituality from scientific point of view. The talk tells about the knowledge instinct, driving growth of the mind, responsible for our higher mental abilities of abstract symbolic thinking, for beautiful and sublime, and for evolution of cultures. A mathematical theory is presented. This theory is a mathematical breakthrough that overcame decades of limitations in AI, pattern recognition, neural networks, and other attempts to solve complex problems by modeling the brain-mind. Solutions of engineering problems are presented that overcome previous difficulties of computational complexity, and result in orders of magnitude improvements in detection, prediction, tracking, fusion, and learning situations. This theory is extended to higher cognitive functions. It models the knowledge instinct operating on the hierarchy of the human brain-mind. At the bottom of the hierarchy are simple objects, higher up are situations, general and abstract concepts, unifying contents of lower levels. At the top are concepts unifying our entire knowledge; we perceive them as concepts of the meaning and purpose of our existence. The mathematical theory explains why these concepts are inherently vague and unconscious and our consciousness is in great doubt about their very existence. When we feel that we have understood them a bit better or our belief in their existence got a bit firmer, we feel the emotion of beautiful. In parallel with the concepts of understanding the meaning and purpose, we have concepts of behavior needed to realize the beauty in our life. When we feel that we have understood these behavioral concepts a bit better or our belief in their existence got a bit firmer, we feel the emotion of spiritually sublime. Science explains that beautiful and sublime are not final notions. It follows from Godel theory, that mechanisms of the highest aspirations of human spirit are not logically reducible to finite statements. Attempts to compute them logically exceed in complexity all elementary interactions in the Universe in its entire lifetime and therefore choices of beautiful and sublime involve more information than is available in the Universe. A possibility of these choices is called a miracle in traditional language. A computational theory of these choices goes together with a proof that science is not reducible. Laws governing our highest values would not be reduced to laws governing a leaf flying with the wind. Hamiltonian formulation of the fundamental laws of physics leads to what is commonly considered a scientific causality: particles and fields move under forces, and the next moment is a consequence of the previous one. Lagrangian formulation leads to teleological formulation: particles and fields move toward a purpose, maximum of Lagrangian function ("minimum of energy" in the parlance of the middle school physics). The Lagrangian equivalence of causality and purpose exists in physics of few particles, but it does not exist in statistical physics of complex systems. The mathematical theory of the knowledge instinct made equivalent causality and teleology for very complex systems, the human mind and culture evolve causally according to dynamic logic and evolve teleologically toward maximization of knowledge. This defines the new "arrow of time." The talk discusses brain imaging experiments conducted at Harvard Brain Imaging Lab confirming this theory. Contents of

models of beautiful and sublime are unconscious; they do not belong to our consciousness. They are "collective," outside of consciousness. Consciousness does not control them, they control our consciousness. Therefore, we feel them as a source of agency outside of ourselves. In recent discussions it is called Designer.

Brief Biography of the Speaker:
Dr. Leonid Perlovsky is Visiting Scholar at Harvard University and Principal Research Physicist and Technical Advisor at the Air Force Research Laboratory, Hanscom AFB. He leads research projects on modeling the mind (including cognitive roles of the beautiful, sublime, and music), computing with words, evolution of languages and cultures, fuzzy dynamic logic, neural networks, cognitive and bio-inspired algorithms for signal processing, prediction, detection, tracking, fusion. As Chief Scientist at Nichols Research, a $0.5B high-tech organization, he led the corporate research in intelligent systems. He served as professor at Novosibirsk University and New York University; as a principal in commercial startups developing tools for biotechnology, text understanding, and financial predictions. His company predicted the market crash following 9/11 a week before the event. He is invited as a keynote plenary speaker and tutorial lecturer worldwide, published more than 360 papers, 11 book chapters, and 3 books, including "Neural Networks and Intellect," Oxford University Press, 2001 (currently in the 3rd printing), awarded 2 patents. Dr. Perlovsky participates in organizing conferences on Computational Intelligence, Chairs IEEE Boston Computational Intelligence Chapter; Co-Chairs IEEE TC on Neural Networks, Chairs IEEE TF on The Mind and Brain, serves on the INNS Board of Governors, where he Chairs Award Committee. He serves on the Editorial Board of five professional journals, including Editor-in-Chief for "Physics of Life Reviews" (which he founded jointly with Nobel Laureate I. Prigogine). He received National and International awards including the Best Paper Award 2001 from Zvezda, a leading Russian literary and essayistic magazine; the Gabor Award 2007, the top engineering award from International Neural Network Society; and the John McLucas Award 2007, the highest US Air Force Award for basic research.