



Editors:

Prof. Roberto Revetria, Univ. Degli Studi di Genova, Italy
Prof. Valeri Mladenov, Technical University of Sofia, Bulgaria
Prof. Nikos Mastorakis, Technical University of Sofia, Bulgaria

Recent Advances IN Electric Power Systems, High Voltages, Electric Machines

Proceedings of the 9th WSEAS/IASME International Conference on
Electric Power Systems, High Voltages, Electric Machines (POWER '09)

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Universita Degli Studi di Genova



University of Genova, Genova, Italy, October 17-19, 2009

Recent Advances in Electrical Engineering
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ISBN: 978-960-474-130-4
ISSN: 1790-5117

Published by WSEAS Press
www.wseas.org

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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>

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World Scientific and Engineering Academy and Society

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Preface

This year the 9th WSEAS/IASME International Conference on ELECTRIC POWER SYSTEMS, HIGH VOLTAGES, ELECTRIC MACHINES (POWER '09) was held in the University of Genova, Genova, Italy, October 17-19, 2009. The conference remains faithful to its original idea of providing a platform to discuss power system planning and management, electric machines, electric vehicles, batteries, high voltage engineering, renewable energy sources and technology, transmission and distribution etc. with participants from all over the world, both from academia and from industry.

Its 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 this conference are published in this Book that will be indexed by ISI. Please, check it: 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.

A Conference such as this 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

Measurements on the Ground and Mathematical Simulation of Voltages Induced by High Voltage Aerial Power Lines Working on Parallel and Narrow Routes



Professor Flavius Dan Surianu

Faculty of Electrical and Power System Engineering
Politehnica University of Timisoara
ROMANIA

E-mail: flavius.surianu@et.upt.ro

Abstract: In the case of parallel and narrow high voltage aerial power lines, where one of the circuits is disconnected, knowing the electric and magnetic coupling mechanisms and the values of the voltages induced by the respective types of couplings at low frequencies is very important for finding the methods and means of warning and protecting the working staff involved in the maintenance programmes on these routes. The paper presents the measurements that the author has done in the south - western area of Romania for the 220 kV double circuit aerial power lines having a passive circuit and an active one. It also describes a mathematical simulation for determining the voltages induced by the active circuit into the disconnected circuit of the power lines, accompanied by a calculating programme of these voltages. The results of the measurements are compared with those obtained through calculations. Thus the mathematical simulation is validated turning it into a useful instrument for electric power specialists.

Brief Biography of the Speaker:

Flavius Dan SURIANU was born in Timisoara, Romania on April, 2, 1949. He received the B.Sc. and the Ph.D. degrees in electric machines from the Politehnica University of Timisoara, in 1972 and 1987, respectively. Since 1977 he has been devoted to education and research at the Politehnica University of Timisoara where he is a professor in areas of Large Industrial Consumer Units, Identification and Mathematical Modeling of Power System Elements and Electromagnetic Compatibility. He is the head of the Power System Department of the Faculty of Electrical and Power System Engineering. He has a remarkable scientific and didactic experience being the author of 15 books, 68 technical papers and 60 research projects, mainly in the fields of transient and long term dynamics of power systems, mathematical models of large consumer units, high voltage and electromagnetic risk, electromagnetic compatibility, energy balances and renewable energies. He is a member of IEEE and CIGRE.

Plenary Lecture 2

Distributed Multi-Generation Systems - Interacting Fields of Knowledge Meet the Research Challenges



Professor Gianfranco Chicco

Dipartimento di Ingegneria Elettrica, Politecnico di Torino
Corso Duca degli Abruzzi 24, 10129 Torino
Italy

E-mail: gianfranco.chicco@polito.it

Abstract: The recent evolution towards designing and exploiting sustainable energy systems has given birth to a broad set of studies addressing technical, economic and environmental issues. In many cases, the related research has been carried out by setting the main focus on one of these issues, while the other ones have been either neglected or introduced in simplified forms, for instance as additional constraints. Nowadays, a new trend is emerging towards an integrated study of the multi-disciplinary aspects related to the energy sector. This trend has the beneficial effect of enhancing the interactions among different scientific areas and worlds. The sharing of concepts, problem formulations and solution methods adopted in different fields of knowledge is increasing on the one hand the complexity of the studies, but is providing on the other hand significant inputs to handle various kinds of complexity in an effective and coordinated way. The presentation addresses the emergent interactions among energy, environmental and economic aspects in the design, planning and operation of local systems for combined production of different energy vectors (such as electricity, heat, cooling, and other products). These systems are interconnected in different ways. Their interactions can be represented through various layers, including a physical layer formed by the network interconnections for exchanging different types of energy; an information layer for data management, communications and control; an economic layer dealing with markets, tariff systems, regulations, and contract provisions; and, an environmental layer dedicated to emission monitoring and trading, with the related regulation aimed at defending the human health and other receptors from the effects of possible hazardous pollutants produced by the energy systems.

The interconnected decentralized energy generation systems are analyzed under the distributed multi-generation (DMG) paradigm. According to this paradigm, a set of unifying approaches is developed to create a consistent framework of analysis. Suitable performance indicators are defined under this framework by exploiting the formal analogies obtained from reformulating specific problems from different fields of research in a consistent way. The DMG-related framework encompasses the already extensive concepts of energy saving, exergy, life cycle assessment, and asset management. Methodological aspects referred to setting up and solving suitable multi-objective optimization problems related to the exploitation of DMG solutions are pointed out. Finally, the perspectives for the scientific community to meet the today's challenges in the combined energy production sector are outlined and discussed.

Brief Biography of the Speaker:

Gianfranco Chicco graduated in Electrical Engineering (honors) at the Politecnico di Torino (PdT), Torino, Italy, in 1987 and received the Ph.D. degree in electrotechnical engineering from the PdT School in 1992. In 1995 he joined the PdT, where he is currently an Associate Professor of Distribution Systems. In 1999, he visited the Electrical and Computer Engineering Department of the University of Illinois at Urbana-Champaign, Urbana, IL. In 2003 he was Member of the Administration Board at the PdT. He has been the scientific responsible or co-responsible of research projects funded by public and private Institutions. He has been the Chairman of the Sixth World Energy System Conference, Torino, Italy, 10-12 July 2006, and the co-Chairman of the Seventh World Energy System Conference, Iasi, Romania, 30 June – 2 July 2008. He is Senior Member of the IEEE PES (Power and Energy Society), Member of the AEIT (the Italian Association of Electrical, Electronic and Telecommunications Engineers), and a Registered professional Engineer in the Province of Torino, Italy. He is the President of the University Academic Planning Council in Electrical Engineering at the PdT. He teaches lectures at the Master and Doctoral levels and is an academic tutor of Doctoral students in Electrical Engineering at the PdT. He is author or coauthor of over 150 publications appeared in national and international journals or Conference Proceedings. He is a co-Guest Editor of two Special Issues dedicated to a selection of scientific papers presented to the Sixth World Energy System Conference, Torino,

10-12 July 2006, for the Energy and the Electric Power Systems Research journals. He has carried out various activities at IEEE Conferences, as Member of the Technical Committee, Track co-Chair of the Technical Program Committee, Conference Session Chairman, Tutorial Organizer and presenter, Member of the Best Student Paper Award Committee, and Reviewer of groups of papers. His research activities include power systems and distribution systems analysis, energy efficiency, distributed multi-generation systems, load management, competitive electricity markets, artificial intelligence applications to electrical systems, and power quality.

Plenary Lecture 3

Recent Advances and Applications of Synchronized Phasor Measurements in Power Systems



Professor Mihai Gavrilas
Technical University of Iasi
Romania
E-mail: mgavril@ee.tuiasi.ro

Abstract: Present power systems operate in more and more difficult conditions generated by various physical and economic factors. These include the need for larger power transfer capabilities over longer distances, insufficient development of the actual transmission systems, ceaseless load growth, large variations of power flows on transmission lines and complex load profiles from the system buses from one day to the next and new constraints imposed by the efficient operation of power markets. By pushing power systems closer to their physical limits, these circumstances led to less reliable operating conditions that require a better control across the entire grid, through more intensive online analysis. At present a common point of view considers that Synchronized Phasor Measurement (SPM) units and Flexible AC Transmission Systems (FACTS), along with distributed generation and storage devices are the main technologies that can successfully and efficiently address such problems. This paper presents the state of the art of the synchronized phasor measurement technology and its applications to power systems, together with detailed results of investigations conducted in this field by the author. A series of ongoing projects implemented in different countries (North America, France, Spain, Italy, Scandinavian countries, Romania, China, and Japan) are briefly presented. A special section will be dedicated to the analysis of the main challenges and opportunities for the SPM technology and its applications in power systems.

Brief Biography of the Speaker:

Mihai Gavrilas was born in Iasi, Romania on February, 6, 1959. He received the M.Sc. degree from the "Gh. Asachi" Technical University of Iasi, Romania, in 1984. Between 1984 and 1988 he worked as a field engineer and then as a design engineer in the field of power station and substation building and design. Since 1988 he has been devoted to education and research at the "Gh. Asachi" Technical University of Iasi, where, at present, he is a professor with the Power System department, inside the faculty of Electrical Engineering. In 1994 he received the Ph D degree in power systems from the Technical University of Iasi. He is reading courses on Power systems steady state and stability analysis, Intelligent systems application in power systems and Electricity markets. He has a remarkable scientific and educational experience being the author or joint author of 10 books, and over 120 papers in the area of power systems and intelligent systems applications, published in international journals and conference proceedings (13 papers in ISI and other indexing international databases). He also has a valuable project management experience (project manager or member in the research team) in over 40 research grants sponsored by research organizations and / or research programs with partners from industry. He is an IEEE member (Power and Energy Society, Computational Intelligence Society, Systems, Man and Cybernetics Society) since 1994, and a CIGRE member since 2008. His main research interests are directed towards multi-objective optimization for power systems steady-state operating conditions, power systems dynamics and control, state estimation and observability analysis in power systems, and computational intelligence application in power systems. He participated in the 8th WSEAS International Conference on POWER SYSTEMS (PS 2008), Santander, Cantabria, Spain.