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NEW ASPECTS OF ENERGY, ENVIRONMENT, ECOSYSTEMS and SUSTAINABLE DEVELOPMENT

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Proceedings of the 4th IASME/WSEAS International Conference on ENERGY,
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Editors:

Prof. Thomas Panagopoulos, University of Algarve, Portugal

Prof. Teresa Noronha Vaz, University of Algarve, Portugal

Prof. Maria Dulce Carlos Antunes, University of Algarve, Portugal

Algarve, Portugal, June 11-13, 2008

Host and Sponsor:

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Preface

This book contains the proceedings of the 4th IASME/WSEAS International Conference on ENERGY, ENVIRONMENT, ECOSYSTEMS and SUSTAINABLE DEVELOPMENT (EEESD'08) which was held Algarve, Portugal on June 11-13, 2008. This conference aims to disseminate the latest research and applications in environment and sustainable development sustainable management, indoor air quality in offices and houses, quality of water, global change, climate and biodiversity, sustainable marine ecosystems, climate and global change, advanced marine research, research on natural hazards, cleaner energy systems, renewable energy systems, combined heat and power systems, combustion and gasification, energy storage and other related topics.

The friendliness and openness of the WSEAS conferences, adds to their ability to grow by constantly attracting young researchers. WSEAS Conferences attract a large number of well-established and leading researchers in various areas of Science and Engineering as you can see from <http://www.wseas.org/reports>. Your feedback encourages the society to go ahead as you can see in <http://www.worldses.org/feedback.htm>

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Expanded and enhanced versions of papers published in these conference proceedings are also going to be considered for possible publication in one of the WSEAS journals that participate in the major International Scientific Indices (Elsevier, Scopus, EI, ACM, Compendex, INSPEC, CSA see: www.worldses.org/indexes) these papers must be of high-quality (break-through work) and a new round of a very strict review will follow. (No additional fee will be required for the publication of the extended version in a journal). WSEAS has also collaboration with several other international publishers and all these excellent papers of this volume could be further improved, could be extended and could be enhanced for possible additional evaluation in one of the editions of these international publishers.

Finally, we cordially thank all the people of WSEAS for their efforts to maintain the high scientific level of conferences, proceedings and journals.

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Plenary Lecture I

Solar radiance measurements for fixed and tracking photovoltaic systems



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Abstract: In order to increase the profitableness of photovoltaic systems (PVS) it is decisive to investigate as deeply as possible the features of the primary energy source (the solar energy). This task can be done during the planning or design phase making the right choices on the technology to adopt, on the deployment of the arrays, on the type of the system (fixed or tracking) and also during the operation as well. In any case suitable instruments to measure some variables connected with the solar radiation are needed. In particular the following considerations should be taken into account: Planning of PVS: just one solar radiation sensor, instead of two, would allow us to make some measurements of the components (beam and diffuse) of the solar radiation; this characteristic is crucial: in fact, very often the only radiation data available to predict energy production of a PVS, in a given site, is the global radiation on horizontal surface and also, when the diffuse component is available, it has been calculated by means of simple experimental expressions that calculate the diffuse components as a function of clearness index KT . On the other hand a long term campaign of measurements of both components could be very useful to evaluate the energy performances of system based on tracking systems. Indeed, if the the diffuse component is small in comparison with the beam one, the system equipped with a tracking system (e.g. concentrating PVSs) is more advantageous as far as the economical aspect is concerned. Operation of PVS: the correct operation of a PV plant can be attained on the basis of monitoring the primary energy (the solar radiation). To calculate the efficiency of the PV field the solar radiation that reaches the PV array should be measured. If the PV panels have a tilt angle different from zero, one or more pyranometers parallel to the arrays have to be installed. In this case, an instrument that can measure both components of the solar radiation could be very useful. In fact, by means of straight calculations it is possible to calculate the radiation that strikes a surface whatever inclination it has, if the beam and diffuse components are known. Most PVSs undergo some type of monitoring for at least a few years after their installation. Such monitoring can have several goals: Ensure that the system is operating properly. Assess the performance of system components, pinpoint faulty devices or devices operating below their nominal performance. Permit the calibration of design and simulation tools. Reveal improvements to the design and increase the understanding of the designer. Despite its usefulness, monitoring is often overlooked. In the past few years, the authors have encountered numerous examples of improper monitoring. For example, in one case, some important variables as diffuse inplane irradiance were simply not monitored. In another case, improper connections of some sensors to the data logger led to useless numbers. In a third case, improper calibration of an instrument led to recording useless data collected for several years. In another case, a data file was inadvertently erased several months after it was recorded – and no back up was available. And in countless cases, the data gathered have been properly analyzed after months – or years. Presenting a review of updated references on this subject and reporting the theoretical basis and qualitative considerations that justify the research on new multipurpose radiation sensors is the purpose of the speakers. Recent developments will be presented by the authors in a paper.

Algarve, Portugal, June 11-13, 2008

Plenary Lecture II

World Energy and Future



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Brief Biography of the Speaker: Professor Kostic's teaching and research interests are in Thermodynamics (a science of energy, the Mother of All Sciences), Fluid Mechanics, Heat Transfer and related fluid-thermal-energy sciences; with emphases on physical comprehension and creative design, experimental methods with computerized data acquisition, and CFD simulation; including nanotechnology and development of new-hybrid, POLY-nanofluids with enhanced properties, as well as design, analysis and optimization of fluids-thermal-energy components and systems in power-conversion, utilizations, manufacturing and material processing. Dr. Kostic came to Northern Illinois University from the University of Illinois at Chicago, where he supervised and conducted a two-year research program in heat transfer and viscoelastic fluid flows, after working for some time in industry.

"Kostic's unique synergy of philosophical, theoretical, computational and experimental approach, results in open mind, intense curiosity and sharp focus for identifying and analyzing natural and engineering phenomena with high motivation for problem identification, troubleshooting and solving."

Kostic received his B.S. degree with the University of Belgrade Award as the best graduated student in 1975. Then he worked as a researcher in thermal engineering and combustion at The Vinca Institute for Nuclear Sciences, which then hosted the headquarters of the International Center for Heat and Mass Transfer, and later taught at the University of Belgrade in ex-Yugoslavia (*). He came to the University of Illinois at Chicago in 1981 as a Fulbright grantee, where he received his Ph.D. in mechanical engineering in 1984. Subsequently, Dr. Kostic worked several years in industry. In addition, he spent three summers as an exchange visitor in England, West Germany, and the former Soviet Union.

Dr. Kostic has received recognized professional fellowships and awards, including multiple citations in Marquis' "Who's Who in the World" and "Who's Who in Science and Engineering."; the Fulbright Grant; NASA Faculty Fellowship; Sabbatical Semester at Fermilab as a Guest Scientist; and the summer Faculty Research Participation Program at Argonne National Laboratory. He is a frequent reviewer of professional works and books in Thermodynamics and Experimental Methods. Dr. Kostic is a licensed professional engineer (PE) in Illinois and a member of the ASME, ASEE, and AIP's Society of Rheology. He has a number of publications in refereed journals, including invited state-of-the-art chapters in the Academic Press series Advances in Heat Transfer, Volume 19, and "Viscosity" in CRC Press' Measurement, Instrumentation and Sensors Handbook; as well as invited reference articles: Work, Power, and Energy in Academic Press/Elsevier's Encyclopedia of Energy; Extrusion Die Design in Dekker's Encyclopedia of Chemical Processing; and Energy: Global and Historical Background and Physics of Energy in Taylor & Francis/CRC Press Encyclopedia of Energy Engineering and Technology. Professor Kostic is a member of the Graduate Faculty at Northern Illinois University.

Algarve, Portugal, June 11-13, 2008

Plenary Lecture III

Water, Environment and Sustainability

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Abstract: After searching the convenient definitions of water, environment and sustainability; it seems evident that there are common links among the three terms; links leaded by the energy spent when water moves the biogeochemical cycles in the Earth surface. Depending on the amount of energy spent in the water cycle a society can be defined as sustainable in which respects to the water and environment interface. Nevertheless, the relationships between water and the environment are far more complex and involve an important amount of societal activities, always with the background of energy and pollution. The relationships water-environment are examined in a general and particular way, defining finally the present status of the interface and the ways the water cycle can be sustainable and the present mistakes. There is not a single solution but a series of different approaches which combined increase the sustainability of the water cycle, especially in areas with water scarcity.

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