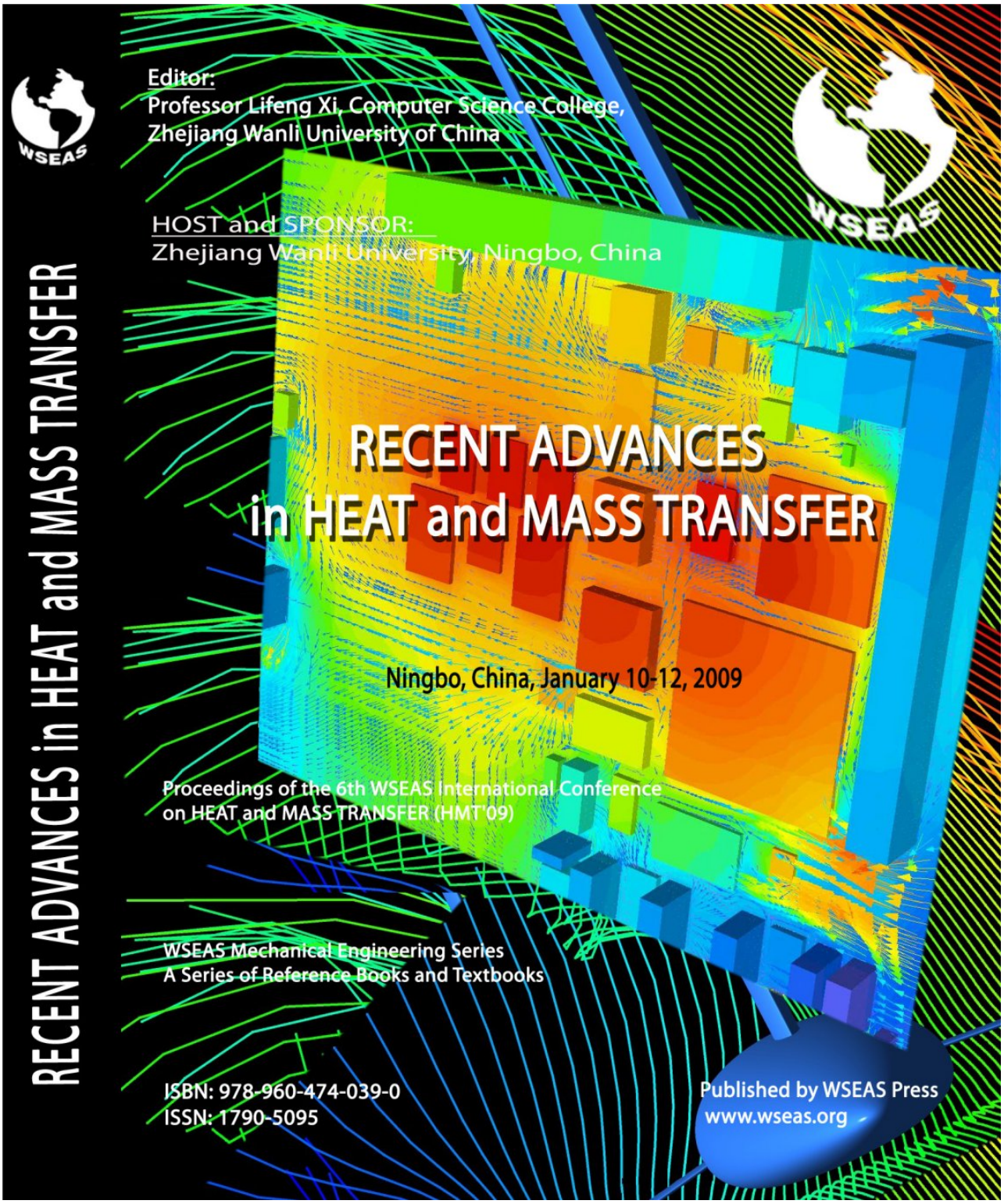
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Preface

On behalf of the Program and Operating Committees of the 6th WSEAS International Conference on HEAT and MASS TRANSFER, we are pleased to welcome you to attend the HMT'09.

Held under the sponsorship of the WSEAS, the conference is co-organized by Zhejiang Wanli University, Ningbo, China and the Scientific Societies WSEAS, www.wseas.org, IASME, www.iasme.org and NAUN www.naun.org.

The conference will be held on January 10-12, 2008 at Zhejiang Wanli University, Ningbo, China. The scope of the Conference covers all the aspects of Heat and Mass Transfer.

Ningbo is a seaport sub-provincial city with a population of 1,219,900 in northeastern Zhejiang province, People's Republic of China. Lying south of the Hangzhou Bay, and facing the East China Sea to the east, Ningbo borders Shaoxing to the west and Taizhou to the south, and is separated from Zhoushan by a narrow body of water.

Ningbo was one of China's oldest cities with a history dating back to 4800 B.C. the Hemudu culture. Ningbo was known as a major trading port along with Yangzhou and Guangzhou in the Tang dynasty; thereafter, the major ports for foreign trade in the Song dynasty. Ningbo was one of the five Chinese treaty ports opened by the Treaty of Nanjing (signed in 1842) at the end of the First Opium War between Britain and China. During the war, British forces took possession of the walled city of Ningbo briefly after storming the fortified town of Zhenhai at the mouth of the Yong River on October 10, 1841. In 1864 the forces of the Taiping Rebellion held the town for six months. Ningbo was once famed for traditional Chinese furniture production.

Zhejiang Wanli University (ZWU), situated in Ningbo Higher Education Zone, covers a total area of 951,809 square meters and consists of Huilong Campus and Qianhu Campus. ZWU has a vey beautiful campus that is well--equipped, widely recognized by people from the education circle. In ZWU, there are Junior College, Business School, Law School, Faculty of Culture and Media, Faculty of Foreign Languages, Faculty of Art and Design, Faculty of Biological and Environmental Sciences, Faculty of Electronic and Information Engineering, Faculty of Computing and Information Technology as well as World College, Adult Education College, with 27 specialties of undergraduate (4-year program) and 30 specialties offering associate degree (3-year program), which contains such disciplines as economics , law, literature, science, engineering, agriculture and management. At present, the total number of full-time students at ZWU is over 16,000.

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.

Only in September of 2008, 21 (twenty one) books from WSEAS Press included in ISI: http://worldses.org/indexes. A very strong and important feature is that the WSEAS is going to give you a new username and password without expiry date for on-line access in the WSEAS Conference proceedings for ever. Several University Faculty Members and Senior Researchers that will be with us in the Conference will be invited as Members in the International Scientific Committee of the same conferences of WSEAS in 2009.

The WSEAS

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Plenary Lecture 1

Heat Transfer, Thermal Energy and Entropy - Demystified

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Abstract: The concept of temperature, thermal energy and heat transfer, and entropy and entropy generation, are all different physical concepts but strongly interrelated. They are all associated with randomized energy redistribution and storage within material systems, and randomized energy transfer in time within and between systems through their real or imaginary interface surfaces. Heat transfer is known as typical spontaneous irreversible process where all organized (structural) energies are disorganized or dissipated as thermal energy with irreversible loss of energy potential (from high to low temperature) and overall entropy increase.

These fundamental concepts will be revisited and highlighted with typical examples and characteristic natural processes with an objective to explain, clarify, and resolve any confusion by correlating and unifying different approaches and nomenclature, related to the universal concept of energy. The fundamental Thermodynamic Laws of Nature are defining and unifying all existence (all natural systems defined by their properties) and all changes (all artificial and natural processes, including life), which are in turn caused by energy transfer from one system or subsystem to another. Due to universality and diversity of Thermodynamics (the Laws of natural and/or man-made processes and properties), it appears to be abstract and difficult to comprehend, regardless that the Laws of Nature are obvious, logical and simple. The basic concepts will be thoroughly defined and illustrated first by simple ideal systems and reversible processes, and then expended to real systems and unavoidable process irreversibilities.

The heat transfer and thermal energy are unique and universal manifestation of all natural and artificial (man-made) processes, and thus are vital for more efficient cooling and heating in new and critical applications, including energy production and utilization, environmental control and cleanup, and bio-medical applications.

Brief Biography of the Speaker: S 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 . More at: http://www.kostic.niu.edu

Plenary Lecture 2

Heat Transfer Measurement and Analysis in Cooling Systems for Hot Components

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Abstract: Proper thermal design is an essential part of hot component developments. Various cooling methods, such as internal passage cooling, impingement jet cooling and film cooling, are widely used to protect hot components from high thermal loads and to achieve higher thermal efficiency. Unsuitable thermal design causes local thermal crack and structural failure and resulting in a reduction of system life. To achieve proper thermal design for hot components, it is very important to conduct detailed measurement and analysis of internal and external heat transfer distribution.

Several methods, such as naphthalene sublimation techniques, thermochromic liquid crystal techniques and infrared thermography, etc, are developed and widely used to measure the heat transfer distribution. The measurement methods are successfully applied to obtain detailed and precise information about external and internal heat transfer distributions of ribbed or dimpled passages, film cooled surface and array jet cooled wall. The detailed measurements make it possible to achieve better thermal design for hot components in gas turbine and rocket/ramjet engines. This lecture will introduce various experiences about heat transfer measurements and cooling system design conducted in Heat Transfer Laboratory at Yonsei University.

Brief Biography of the Speaker: Hyung Hee Cho received the B.S. and M.S. degrees in mechanical engineering from Seoul National University, Seoul, Korea, in 1982 and 1985, respectively. He received Ph.D. degree in mechanical engineering from University of Minnesota, Minneapolis, USA. His dissertation mainly deals with heat/mass transfer characteristics in cooling technology which is mostly applied to gas turbine blades/combustors as well as ramjet combustors.

In 1995, he joined the Department of Mechanical Engineering, Yonsei University, Seoul, Korea, where he is currently a full professor in the School of Mechanical Engineering. From 2003 to 2005, he was the Chairman of Department of Mechanical Engineering at Yonsei University. From 2005 to 2007, he held position as the Associate Dean of College of Engineering at Yonsei University.
His research interests include heat transfer control and design in macro-scale devices as well as micro/nano-scale components. For macro-scale devices, he has been working on heat transfer in turbomachineries and rocket/ramjet. Especially, with intensive research on various cooling techniques such as film cooling, internal passage cooling, and impingement/effusion cooling, he has accomplished major research achievements including numerous papers and patents. For micro/nano-scale components, he has worked on thermal transport phenomena in low dimensional materials as well as thermal management in semiconductor devices. Recently, he has been working on performance improvement of proton exchange membrane fuel cell (PEMFC) by controlling heat transfer and flow characteristics on separator plate.

He is a recipient of numerous awards such as KSME Scientific Achievement Award (2000), Yonsei Academic Achievement Award (2001), KSFTS best paper award (2006) and KFMA Scientific Achievement Award (2008). He

has served as a committee member for various institutions such as ASME K-14 (Heat Transfer in Gas Turbine) Committee, ASME-PID Committee, and ISO TC-192 (Gas Turbine). He also has served as a Vice President of Energy and Power Division of KSME (Korean Society of Mechanical Engineers) and a Chairman for the Gas Turbine division of KFMA (Korean Fluid Machinery Association). He has served as an associate editor of Journal of Mechanical Science and Technology and International Journal of Air-Conditioning and Refrigeration. He is currently an editorial board for JP Journal of Heat and Mass Transfer, Advances in Mechanical Engineering and International Journal of Fluid Machinery and Systems.