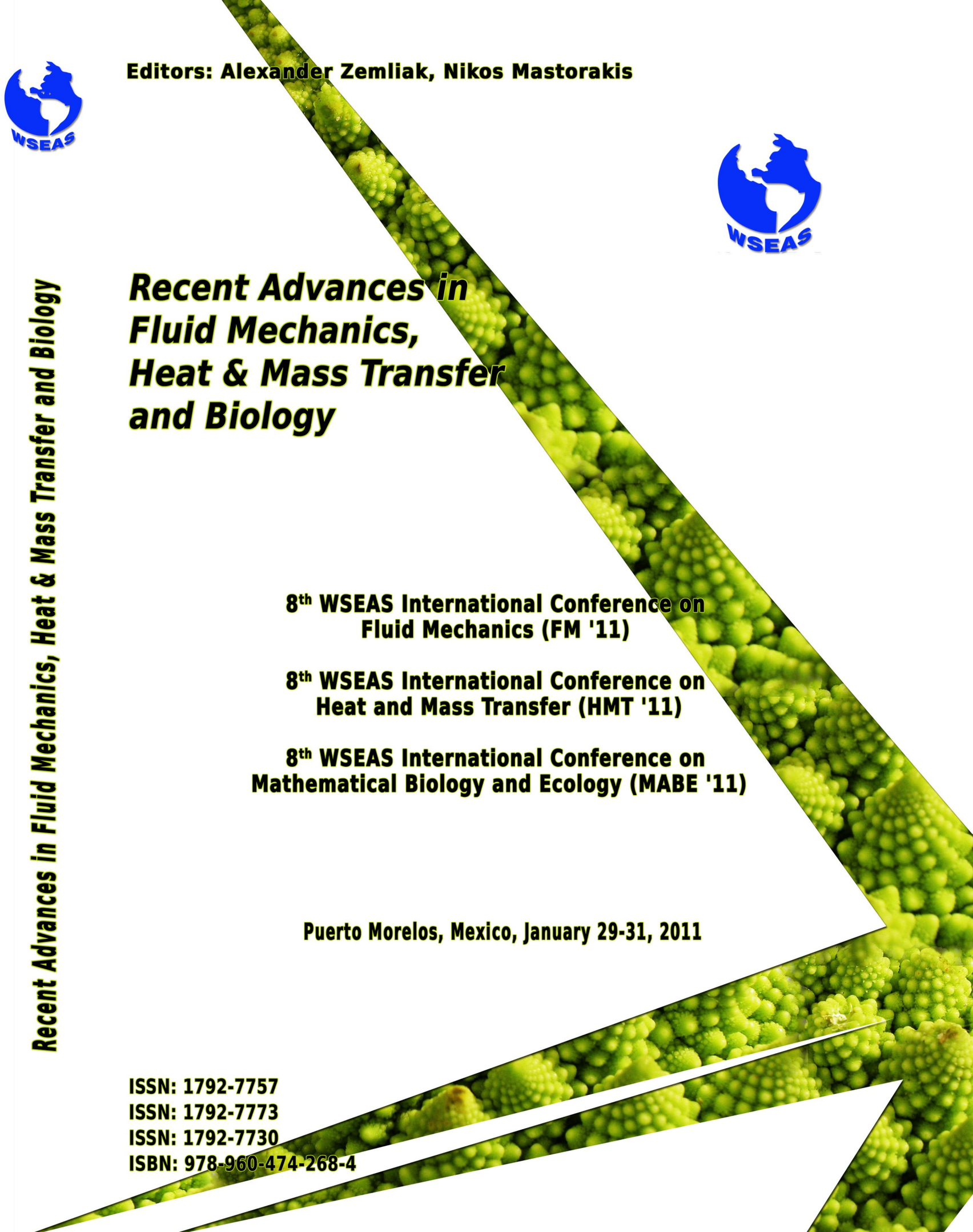

Editors: Alexander Zemliak, Nikos Mastorakis

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Preface

This year the 8th WSEAS International Conference on FLUID MECHANICS (FM '11), the 8th WSEAS International Conference on HEAT and MASS TRANSFER (HMT '11) and the 8th WSEAS International Conference on MATHEMATICAL BIOLOGY and ECOLOGY (MABE '11) were held in Puerto Morelos, Mexico, January 29-31, 2011. The conferences remain faithful to their original idea of providing a platform to discuss mathematical modeling in fluid mechanics, simulation in fluid mechanics, hydrodynamics, plasma science, hydrology, thermal engineering, continuum mechanics, heat storage, climatology, solar energy, biophysics, genetics, molecular dynamics, quantum chemistry, photobiology, signal transduction, environmental systems, evolution, medical imaging, nuclear biology and medicine, speech synthesis 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 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

Discussion of the Problem on Designing the Global Database for Different Kinds of Quenchants

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Abstract: To make computer simulations for heat treating industry possible, especially modeling of the very complicated quenching processes, there is need to have database for cooling capacity of different kinds of quenchants. Unfortunately, there is no such database available for engineers and computer programmers. The three teams in the world were organized to develop desired database. The US team uses standard Inconel 600 probe with the one thermocouple at the core to measure cooling capacity of the quenchants. The Japanese team uses silver probes with the one thermocouple at the core to measure cooling capacity of the quenchants. It is shown that Inconel 600 probe can provide only with the effective heat transfer coefficients which can be used for core cooling rate calculations and are not suitable for temperature fields and residual stress distribution calculations in steel parts during quenching. Silver probes can be used to investigate heat transfer coefficients during full film boiling and to measure critical heat flux densities. During quenching of real steel parts in cold water and water solutions film boiling in many cases is completely absent. That is why the heat transfer coefficient's data received by testing silver probes cannot be used for calculations temperature fields and residual stress distribution in real steel parts during quenching because silver probes create stable full film boiling (due to very high thermal conductivity of silver) and in the same time the film boiling during quenching of real steel parts can be absent. So it is impossible to use the film boiling data as the nucleate boiling data and the nucleate boiling data as the film boiling data. To make generalization possible, the third International WSEAS team uses another approach (see www.worldses.org/projects/Heat_and_Mass_Transfer.doc). 1. First of all, the critical heat flux densities should be measured for different kinds of quenchants. 2. The initial heat flux densities during immersion of steel parts into quenchant should be calculated and compared with the critical heat flux densities. 3. The heat transfer coefficient should be calculated on the basis of testing Liscic probe and solving inverse problem. This approach allows predicting the film or nucleating boiling processes to correctly calculate temperature fields and residual stress distribution. To discuss widely the existing three approaches, the members of all three teams and engineers from universities and big companies are invited to participate in discussion of the problem at the WSEAS Conferences. In the plenary lecture the main achievements of the third team will be widely discussed to accelerate transition from high costly technological processes to less costly technological processes, to increase service life of steel parts and make environment cleaner. There is need to put efforts of the three teams together and to have sponsors from the big companies to further develop appropriate database for heat treating industry.

Brief Biography of the Speaker: Dr. Nikolai Kobasko received his PhD from the National Academy of Sciences of Ukraine in 1969. He is a leading expert on quenching and heat transfer during the hardening of steels. He is the author and co-author of more than 250 scientific and technical papers, several books and brochures, and more than 30 patents and certificates. In 2004, Dr. Nikolai Kobasko received the Da Vinci Diamond Award and Certificate in recognition of an outstanding contribution to thermal science. Dr. Nikolai Kobasko is Co-Editor of the WSEAS TRANSACTIONS on HEAT and MASS TRANSFER and is a member of Editorial Board for International Journal of Mechanics (NAUN) and Journal of ASTM International (JAI). He was the Head of the laboratory of the Thermal Physics Institute of the National Academy of Sciences of Ukraine. He is co-founder of two consulting companies: IQ Technologies Inc. Akron, USA (1999) and Intensive Technologies Ltd, Kiev, Ukraine (2000). The aim of both companies is material savings, ecological problems solving and increaing service life of steel parts. In 2009 for substantial and innovative contributions to thermal science and heat treating technologies, including development of novel quenching methods and application of computational models to thermal processes Dr. Nikolai Kobasko was elected as ASM International Fellow (FASM). At present he is the Director of Technology and R&D of IQ Technologies Inc., Akron, USA and also President of the Intensive Technologies Ltd., Kiev, Ukraine. More information is provided in http://www.intensivequench.com and http://www.itl.kiev.ua.

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