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Professor Lifeng Xi, Computer Science College,  
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**RECENT ADVANCES in FLUID MECHANICS**

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Proceedings of the 6th WSEAS International Conference  
on FLUID MECHANICS (FLUIDS'09)

**Ningbo, China, January 10-12, 2009**

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A Series of Reference Books and Textbooks

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## **Preface**

On behalf of the Program and Operating Committees of the 6th WSEAS International Conference on FLUID MECHANICS, we are pleased to welcome you to attend the FLUIDS'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](http://www.wseas.org), IASME, [www.iasme.org](http://www.iasme.org) and NAUN [www.naun.org](http://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 Fluid Mechanics.

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 very 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](http://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

### The CFD Simulation of Flooding Flows and Scouring Around Bridge Structures for Improved Design and Stability



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**Abstract:** The ‘bridge hydraulic analysis and design’ could be substantially enhanced using advanced commercial Computational Fluid Dynamics (CFD) software and powerful parallel computing resources. Key objectives are to evaluate the capabilities of the state-of-the-art CFD codes for the prediction of experimental results for lift and drag forces and scouring on inundated bridges, conducted at Turner-Fairbank Highway Research Center (TFHRC), and the development of “best practices” for the application of the CFD. These research activities are part of a multi-year program initiated by Argonne National Laboratory with the US Department of Transportation (USDOT), to establish the Transportation Research and Analysis Computing Center (TRACC), a national supercomputing user facility for advanced computing, visualization, and high-speed networking, based on a massively parallel computer system.

Early results have focused on the examination and determination of best practices, with emphasis on mesh spacing, time step selection and turbulence modeling. Preliminary two-dimensional model results show reasonable agreement with limited experimental data. Continuing work will focus on further development and optimization of the simulation methods and examination of three-dimensional models.

Future activities will address diverse research needs of the transportation community in bridge hydraulics, including the assessment of lift and drag forces on bridge decks when flooded, analysis of sediment transport and its influence on scouring, optimization of bridge deck-shapes to minimize flow forces and pressure flow scour, evaluation of active and passive scour countermeasures, and addressing environmental issues such as fish passage through culverts.

**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>

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