Advances in Computational Fluid–Structure Interaction and Flow Simulation (AFSI 2014)

A Conference Celebrating the 60th Birthday of Tayfun E. Tezduyar

Contents

Introduction

Advances in Computational Fluid–Structure Interaction and Flow Simulation (AFSI 2014) — A Conference Celebrating the 60th Birthday of Tayfun E. Tezduyar is being held on March 19–21, 2014, at Waseda University, in Tokyo. AFSI 2014 also features a **student poster session**, held during the conference, and a **post-conference short course on Computational Fluid–Structure Interaction**, held on March 22–23, 2014.

AFSI 2014 is a conference whose main objective is to celebrate the exemplary research achievements of Tayfun Tezduyar in Computational Mechanics (CM), and his impact in the CM community at large. The main technical focus of the conference is on methods and applications of computational fluid mechanics and fluid–structure interaction, Tayfun Tezduyar's main research areas. Other areas of CM, such as computational mathematics, solid and structural mechanics and materials, and geometry modeling and mesh generation, are also represented at AFSI 2014. The latter fact is indicative of the breadth of Tayfun Tezduyar's impact in the community. While the conference program features technical presentations from highly-cited, well-established senior members of the international CM community, many presentations are also given by young, dynamic, and already visible researchers, a testament to the likelihood that Tayfun Tezduyar's work will live on for many generations to come.

AFSI 2014 is partially supported by Waseda Institute for Advanced Study, Advanced Multicore Processor Research Institute, Japan Association for Computational Mechanics, Explosion Research Institute Inc., and Morikita Publishing Co., Ltd.

Kenji Takizawa
Waseda University
Tokyo

Yuri Bazilevs
University of California
San Diego

Conference Co-Chairs

Program Overview

	Wednesday, March 19	
	Room A	Room B
11:00–11:l5	Opening Remarks	
Keynote Session 1 11:15–12:30	Chair: Y. Bazilevs T.J.R. Hughes L.D. Marini F. Brezzi	
12:30–13:40	Lunch Break and Poster Session	
Invited Session 1 13:40–15:20	Chair: K. Takizawa M. Tabata K. Kashiyama T. Kvamsdal A. Reali M.-C. Hsu	
15:20–15:40	Coffee Break and Poster Session	
Invited Session 2A, 2B 15:40–17:20	Chair: S. Idelsohn H. Notsu B. Avci S. Takagi K. Fujisawa S. Asao	Chair: G. Yagawa Y. Nakabayashi Y. Ogata T. Sawada T. Opstal J.-S. Wu
18:30	Welcome Reception	

	Thursday, March 20	
	Room A	Room B
Keynote Session 2 09:30–10:45	Chair: K. Takizawa A. Sameh S. Idelsohn Y. Bazilevs	
10:45–11:00	Coffee Break and Poster Session	
Invited Session 3 11:00–12:40	Chair: Y. Bazilevs G. Yagawa Y.-S. Chen S. Yoshimura E.H. van Brummelen M. Mehl	
12:40–13:40	Lunch Break and Poster Session	
Invited Session 4A, 4B 13:40–15:20	Chair: A. Sameh R. Himeno P. Nørtoft A. Korobenko T. Aoki M. Manguoglu	Chair: A. Quarteroni T. Ishikawa K. Tsubota Y. Imai M. Conti S. Hossain
15:20–15:40	Coffee Break and Poster Session	
Invited Session 5A, 5B 15:40–17:20	Chair: K. Takizawa A. Massing J. Kusaka C.-Y. Chen F. Xiao M. Cruchaga	Chair: T.J.R. Hughes J.-S. Chen O. Wodo B. Ganapathysubramanian S. Keten H. Okumura
17:20–18:00	Poster Session	

	Friday, March 21	
	Room A	Room B
Keynote Session 3 09:30–10:45	Chair: Y. Bazilevs N. Satofuka Y. Matsumoto K. Takizawa	
10:45–11:00	Coffee Break and Poster Session	
Invited Session 6 11:00–12:40	Chair: K. Takizawa T. Hisada A. Quarteroni C.-A. Lin H. Suito R. Torii	
12:40–13:40	Lunch Break and Poster Session	
Invited Session 7A, 7B 13:40–15:20	Chair: N. Satofuka K. Fujii T. Nomura A. Masud S. Koshizuka J. Evans	Chair: Y. Matsumoto M. Oshima N. Saito J. Zhang K. Sugiyama S. Ii
15:20–15:40	Coffee Break and Poster Session	
Invited Session 8 15:40–17:20	Chair: Y. Bazilevs F. Rispoli S. Mittal Y. Osawa A. Corsini R. Ohayon	
18:30	Banquet	

Sessions

Wednesday, March 19

Opening Remarks

11:00–11:15

K. Takizawa and **Y. Bazilevs**

Keynote Session 1

Thermodynamically Consistent Modeling and Simulation of Liquid–Vapor Phase Transition

11:15–11:40

T.J.R. Hughes (The University of Texas at Austin)

Basic Principles of Mixed Virtual Element Methods

11:40–12:05

F. Brezzi, R.S. Falk and **L.D. Marini** (Universitá di Pavia)

H (div)- and H (curl)-conforming Virtual Element Spaces

12:05–12:30

L. Beirão da Veiga, **F. Brezzi** (IMATI-CNR-Pavia), L.D. Marini and A. Russo

Invited Session 1

Galerkin-Characteristics Finite Element Schemes for the Navier–Stokes Problems

13:40–14:00

M. Tabata (Waseda University)

Modeling and Simulation of Tsunami Waves using VR Technology

14:00–14:20

K. Kashiyama (Chuo University), T. Fumuro, T. Kawabe, S. Takase, S. Tanaka and T.E. Tezduyar

Isogeometric CFD and FSI Simulations

14:20–14:40

T. Kvamsdal (SINTEF ICT), R. Holdahl, A.M. Kvarving, K.M. Okstad and K. Nordanger

Numerical Studies on the Stability of Mixed Finite Elements over Anisotropic Meshes Arising from Immersed-Interface Stokes Problems

14:40–15:00

F. Auricchio, F. Brezzi, A. Lefieux and **A. Reali** (Universitá di Pavia)

Weak Imposition of Interface Constraints for Fluid–Structure Interaction Problems

15:00–15:20

M.-C. Hsu (Iowa State University) and Y. Bazilevs

Invited Session 2A

Development of a Stabilized Characteristics Finite Element Scheme for the Navier–Stokes Equations in a Time-Dependent Domain

15:40–16:00

H. Notsu (Waseda University)

A Direct Numerical Scheme for Simulation of Particles in Fluids

16:00–16:20

B. Avci (Leibniz University of Hannover) and P. Wriggers

A Fully-Eulerian Finite Difference Method for Fluid–Structure Interaction Problems with Applications to Blood Flows

16:20–16:40

S. Takagi (The University of Tokyo), K. Sugiyama, S. Ii, S. Shiozaki and Y. Matsumoto

Computation of Seepage-Induced Erosion using Darcy–Brinkman Equations

16:40–17:00

K. Fujisawa (Kyoto University)

Simulations of Multiple Falling Spheres in an Infinitely-Long Pipe using Progressive Moving-Grid Finite-Volume Method

17:00–17:20

S. Asao (College of Industrial Technology), K. Matsuno, M. Yamakawa and T. Inomoto

Invited Session 2B

An Efficient Approach for the Fluid–Structure Interaction Problems Based on the Stabilized Finite Element Method and the Enriched Free Mesh Method

15:40–16:00

Y. Nakabayashi (Toyo University), S. Nagaoka and G. Yagawa

Self-Propulsion of a Killifish from Impulsive Starts

16:00–16:20

Y. Ogata (Hiroshima University), Y. Moriyama, T. Azama, C. Tanaka and K. Nishida

FSI Simulation of Coupled Flutter of Flexible Filaments in a Flow

16:20–16:40

T. Sawada (National Institute of Advanced Industrial Science and Technology)

Finite-Element/Boundary-Element Coupling for Inflatables

16:40–17:00

T. Opstal (Norwegian University of Science and Technology) and E.H. van Brummelen

Development and Verification of a Parallel Explicit Finite-Volume Euler Equation Solver using the Immersed-Boundary Method with Hybrid MPI-CUDA Paradigm

17:00–17:20

F.-A. Kuo, M.R. Smith, J.-P. Su and **J.-S. Wu** (National Chiao Tung University)

Thursday, March 20

Keynote Session 2

Scalable Parallel Sparse Matrix Computations

09:30–09:55

A. Sameh (Purdue University)

Incompressible Multi-Fluid Flows Solved with Large Time Steps

09:55–10:20

S. Idelsohn (International Center for Numerical Methods in Engineering (CIMNE)), E. Oñate, N. Nigro, J. Marti, P. Becker and J. Gimenez

The Influence of Tayfun Tezduyar on My CFD and FSI Research, and Beyond

10:20–10:45

Y. Bazilevs (UC San Diego)

Invited Session 3

High-Performance Computing for Fluid–Structure Interaction with Application to Splash Problem

11:00–11:20

M. Yokoyama, K. Murotani, R. Shioya, M. Ogino, O. Mochizuki and **G. Yagawa** (Toyo University)

Transient Nozzle Side Load Analysis with Fluid–Structure Interaction Simulations

11:20–11:40

Y.-S. Chen (National Space Organization), T.-S. Wang, X. Zhao and S. Zhang

MPS-FE Coupled Method for Fluid–Structure Interaction with Free-Surface Flow

11:40–12:00

S. Yoshimura (The University of Tokyo), N. Mitsume, T. Yamada and K. Murotani

Partitioned Iterative Solution Methods for Fluid–Structure Interaction

12:00–12:20

E.H. van Brummelen (Eindhoven University of Technology)

Options for Space–Time Discretization in Partitioned Fluid–Structure Interaction Simulations

12:20–12:40

M. Mehl (Universität Stuttgart) and B. Uekermann

Invited Session 4A

Perspective of CFD Algorithms and Usages of Exa FLOPs Computers in 2020s

13:40–14:00

R. Himeno (RIKEN)

Shape Optimization and Adaptive Refinement in Flow Simulations using Isogeometric Analysis

14:00–14:20

P. Nørtoft (Technical University of Denmark), J. Gravesen and T. Dokken

Advances in Computational FSI Including Dynamically Data-Driven Simulations

14:20–14:40

A. Korobenko (UC San Diego), X. Deng, J. Yan, M.-C. Hsu and Y. Bazilevs

Peta-Scale Flow Simulations using GPUs

14:40–15:00

T. Aoki (Tokyo Institute of Technology)

Novel Algorithms for Solving Large Sparse Linear Systems of Equations in Parallel

15:00–15:20

M. Manguoglu (Middle East Technical University)

Invited Session 4B

A Bottom-Up Approach in Biological Flow Studies

13:40–14:00

T. Ishikawa (Tohoku University)

Particle Method Computer Simulation of Thrombus Formation in Single Ventricle

14:00–14:20

K. Tsubota (Chiba University), K. Okauchi, K. Sughimoto and H. Liu

How Does Gastric Mixing Proceed over Minutes?

14:20–14:40

Y. Imai (Tohoku University), I. Kobayashi, T. Miyagawa, S. Ishida, T. Yamaguchi and T. Ishikawa

Aortic Hemodynamics Post Thoracic Endovascular Repair (TEVAR): a Focus on Birdbeak Drawback

14:40–15:00

M. Conti (Universitá di Pavia), F. Auricchio, A. Lefieux, S. Morganti, A. Reali, T. Passerini, A. Veneziani, F. Secchi, S. Sardanelli and S. Trimarchi

Modeling Patient-Specific Blood Flow and Particle Adhesion in Femoral Arteries: Insights into Peripheral Arterial Disease Management

15:00–15:20

S. Hossain (Texas Heart Institute), J. Zhang, X. Fu, J. Singh, T.J.R. Hughes, D. Shah and P. Decuzzi

Invited Session 5A

Cut Finite Element Methods for Fluid and Fluid–Structure Interaction Problems

15:40–16:00

A. Massing (Simula Research Laboratory)

Combustion and Emissions Formation in the Cylinder of Modern Diesel Engines

16:00–16:20

J. Kusaka (Waseda University)

Control of Viscous Fingering Instability on Radial Hele–Shaw Flows

16:20–16:40

C.-Y. Chen (National Chiao Tung University) and Y.-S. Huang

Accurate and Robust Multi-Moment Finite Volume Fluid Solver for Arbitrary Unstructured Grids

16:40–17:00

F. Xiao (Tokyo Institute of Technology)

Modeling the Free-Surface Evolution for Sloshing Problems under Seismic Accelerations

17:00–17:20

M. Cruchaga (Universidad de Santiago de Chile)

Invited Session 5B

A Level-Set Enhanced Frictional Kernel Contact Algorithm for Impact and Penetration Modeling

15:40–16:00

J.-S. Chen (UC San Diego), S.-W. Chi, C.-H. Lee and P.-C. Guan

Modeling Topological Effects on Multiphase Fluids: Self-Lubricating, Self-Healing and Self-Cleaning Surfaces

16:00–16:20

O. Wodo (Iowa State University), Y. Xie and B. Ganapathysubramanian

Modeling Fabrication of Thin Film Electronics: Fluid Mechanics and Morphology Evolution

16:20–16:40

B. Ganapathysubramanian (Iowa State University), Y. Xie and O. Wodo

Mesoscale Modeling of the Interfacial Mechanics of Supported Polymer Thin Films

16:40–17:00

S. Keten (Northwestern University)

A Newer Fluid Flow Model Circumventing the Incompresibility Condition Based on a Characeristic Finite Element Method

17:00–17:20

H. Okumura (University of Toyama), I. Uchiyama and M. Kawahara

Friday, March 21

Keynote Session 3

Personal Recollection of 50 Years of Flow Simulation

09:30–09:55

N. Satofuka (Kyoto Institute of Technology/University of Shiga Prefecture)

Multiscale Simulation of Thrombosis Formation

09:55–10:20

Y. Matsumoto (The University of Tokyo), S. Ii, S. Shiozaki, K. Sugiyama and S. Takagi

Computational Engineering Analysis with the New-Generation Space–Time Methods

10:20–10:45

K. Takizawa (Waseda University) and T.E. Tezduyar

Invited Session 6

Multiscale Multiphysics Heart Simulator UT-Heart

11:00–11:20

T. Hisada (The University of Tokyo)

Model-Order Reduction for Cardiovascular Modeling

11:20–11:40

A. Quarteroni (MATHICSE)

Prediction of Dynamics and Thermal Fields using Immersed Boundary Method with Moving Embedded Object

11:40–12:00

C.-C. Liao and **C.-A. Lin** (National Tsing Hua University)

FSI Simulation of Blood Flow in Thoracic and Abdominal Aortas

12:00–12:20

H. Suito (Okayama University), T. Ueda, K. Takizawa and T.E. Tezduyar

The Application of Element-Based Zero-Stress State Model to a Human Right Coronary Artery with MR-Based Dynamic Vessel Motion

12:20–12:40

R. Torii (University College London), K. Takizawa, H. Takagi, T.E. Tezduyar and X.Y. Xu

Invited Session 7A

Flow and Acoustic Simulations of Rocket Plume and Other Applications — Impact of Spectral-like Schemes over Practical LES Study

13:40–14:00

K. Fujii (Japan Aerospace Exploration Agency)

The Advection–Diffusion Analysis of Smoke Flow around a Body

14:00–14:20

T. Nomura (Nihon University), H. Hasebe and T. Kobayashi

A Stabilized Mixed Finite Element Method for Shear-Rate Dependent Non-Newtonian Fluids

14:20–14:40

A. Masud (University of Illinois) and J. Kwack

Multiphysics Simulation using Particle Methods

14:40–15:00

S. Koshizuka (The University of Tokyo)

Conservation of Geometry and Physics in Numerical Simulation of Incompressible Flow

15:00–15:20

J. Evans (University of Colorado Boulder) and T.J.R. Hughes

Invited Session 7B

FSI Simulation of a Cerebral Aneurysm with Peripheral Network of Cerebrovascular Circular System

13:40–14:00

M. Oshima (The University of Tokyo) and Y. Ishigami

Energy Inequalities and Outflow Boundary Conditions for the Navier–Stokes Equations

14:00–14:20

N. Saito (The University of Tokyo)

Challenges and Advances in Image-Based Geometric Modeling and Mesh Generation

14:20–14:40

J. Zhang (Carnegie Mellon University)

Development of Multiscale Simulator for the Primary Stage of Thrombus Formation

14:40–15:00

K. Sugiyama (RIKEN), S. Ii, S. Takagi and Y. Matsumoto

Numerical Study of Acoustic Fluctuations in Low Mach Number Flows with a Projection-Based Method

15:00–15:20

S. Ii (Osaka University) and S. Wada

Invited Session 8

Two-Phase Turbulent Compressible-Flow Computation with the V-SGS Stabilization and YZβ Shock Capturing

15:40–16:00

F. Rispoli (University of Rome "La Sapienza"), R. Saavedra, G. Delibra, P. Venturini, A. Corsini and T.E. Tezduyar

Aerodynamic Shape Optimization using Adjoint-Based Methods

16:00–16:20

S. Mittal (Indian Institute of Technology Kanpur)

Simulation Technologies for Tire Research and Development

16:20–16:40

Y. Osawa (Bridgestone Corp.)

Particle Dispersion by Turbulence in Turbomachinery using VMS-Based Particle-Cloud Tracking Method

16:40–17:00

A. Corsini (University of Rome "La Sapienza"), F. Rispoli, A.G. Sheard, T.E. Tezduyar, K. Takizawa and P. Venturini

Reduced-Order Models for Fluid–Structure Modal Analysis

17:00–17:20

R. Ohayon (Conservatoire National des Arts et Metiers (CNAM))

Authors Index

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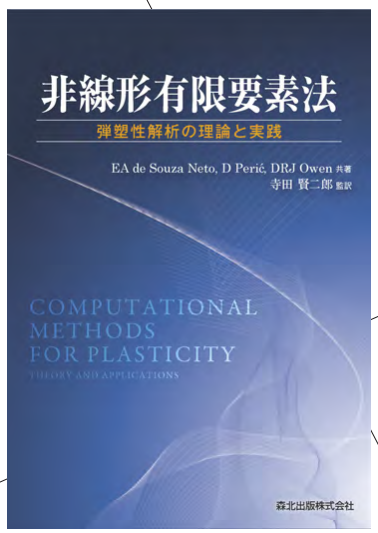

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弾塑性解析の理論と実践

寺田 賢二郎　監訳

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E. A. de Souza Neto
D. Peric
D. R. J. Owen

全16章

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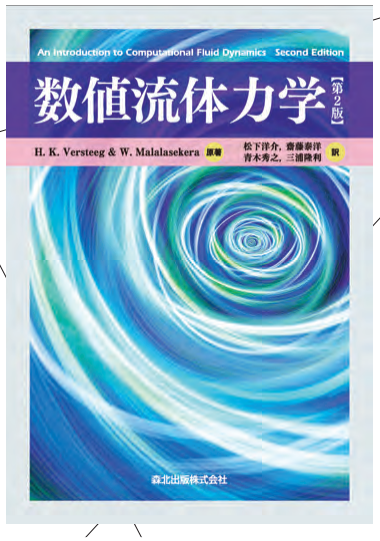
W.Malalasekera
H.K.Versteeg



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