

# **Conference Schedule**

## **Third M.I.T. Conference on Computational Fluid and Solid Mechanics**

**June 14-17, 2005**

**The mission of the Conference:**  
*To bring together Industry and Academia and  
To nurture the next generation in computational mechanics*



**Chronological List of Sessions  
(Titles only)**



**Tuesday 8:50am**

**Welcome and Opening of Conference**

K.J. Bathe

**Plenary Lectures**

Chairperson: M.L. Bucalem

**9:00 - 10:30am**

**Room:** Kresge Auditorium (W16)

**Lagrangian methods in fluids and combustion**

A.F. Ghoniem, M.I.T.

**Computational mechanics and natural draft cooling towers: From struggle for safety to designed life-duration**

W.B. Krätzig, Krätzig & Partners

**10:30 - 11:00am**

Coffee Break

**Tuesday 11:00am - 12:30pm**

Reliability and robust design, Session 23 Part I; Room 1-135  
Advances in the analysis of shells, Session 47 Part I; Room 1-190  
Mechanics of woven fabrics and woven-reinforced composites, Session 80 Part I; Room 1-246  
Formulations and algorithms for PDEs, Session 202 Part I; Room 1-273  
Meshless and generalized finite element methods, Session 16 Part I; Room 1-277  
Optimal design of bolted joints, Session 94 Part I; Room 1-371  
Error control and mesh adaptation in FEA, Session 25 Part I; Room 1-375  
Optimization - Research and applications, Session 22 Part I; Room 1-379  
Discontinuous Galerkin methods for PDEs, Session 15 Part I; Room 2-105  
Advances and applications of computational methods in aerospace, Session 4 Part I; Room 2-131  
Computational multiscale modeling, Session 54 Part I; Room 2-132  
Advanced analysis – Multiphysics, Session 28 Part I; Room 2-135  
Advances in computational structural dynamics, Session 82, Part I; Room 2-136  
Computational stochastic mechanics, Session 70 Part I; Room 2-139  
Electro-magneto-mechanics of smart structures, Session 77 Part I; Room 2-142  
Turbulence modeling for industrial CFD, Session 51 Part I; Room 2-143  
Discrete and kinetic methods for modeling gas, fluid and ionized media flows, Session 3 Part I; Room 2-146  
Modeling coupled and transport phenomena in nanotechnology, Session 45 Part I; Room 2-147  
Advances in wave propagation analyses, Session 50, Part I; Room 2-151  
Biomechanics of soft and hard tissues, Session 84 Part I; Room 4-270  
Computational plasticity, Session 101 Part I; Room 4-370  
Nonlinear dynamics and special problems of fluid-structure interactions, Session 20 Part I; Room 10-250  
Computational fluid dynamics I, Session 222 Part I; Room 32-123  
Computational fluid dynamics II, Session 200 Part I; Room 32-124  
Computational fluid and solid geodynamics: Methods and challenges, Session 40 Part I; Room 5-234

**Tuesday 2:00 - 4:00pm; 4:30pm - End**

Reliability and robust design, Session 23 Part II; Room 1-135  
Advances in the analysis of shells, Session 47 Part II; Room 1-190  
Mechanics of woven fabrics and woven-reinforced composites, Session 80 Part II; Room 1-246  
Formulations and algorithms for PDEs, Session 202 Part II; Room 1-273  
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Computational fluid and solid geodynamics: Methods and challenges, Session 40 Part II; Room 5-234

**Wednesday 9:00am**

**Plenary Lectures**  
Chairperson: F. Brezzi

**9:00 - 10:30am**

**Room:** Kresge Auditorium (W16)

**Open problems in elasticity**  
J.M. Ball, University of Oxford

**Fundamental and applicative challenges in the modeling and computations of shells**  
D. Chapelle, INRIA-Rocquencourt

**10:30 - 11:00am**

Coffee Break



**Wednesday 11:00am - 12:30pm**

Reliability and robust design, Session 23 Part III; Room 1-135  
Advances in the analysis of shells, Session 47 Part III; Room 1-190  
Interface capturing and multi-fluid dynamics, Session 92 Part I; Room 1-242  
Mechanics of woven fabrics and woven-reinforced composites, Session 80 Part III; Room 1-246  
Formulations and algorithms for PDEs, Session 202 Part III; Room 1-273  
Meshless and generalized finite element methods, Session 16 Part III; Room 1-277  
Vortex dominated flows, Session 48 Part I; Room 1-371  
Error control and mesh adaptation in FEA, Session 25 Part III; Room 1-375  
Optimization - Research and applications, Session 22 Part III; Room 1-379  
Discontinuous Galerkin methods for PDEs, Session 15 Part III; Room 2-105  
Advances and applications of computational methods in aerospace, Session 4 Part III; Room 2-131  
Computational multiscale modeling, Session 54 Part III; Room 2-132  
Advanced analysis – Multiphysics, Session 28 Part III; Room 2-135  
Discretization methods with finite volumes, discontinuous Galerkin methods and the application in porous media, Session 91, Part I; Room 2-136  
Computational stochastic mechanics, Session 70 Part III; Room 2-139  
Electro-magneto-mechanics of smart structures, Session 77 Part III; Room 2-142  
Advanced analysis – Solids, Session 26 Part I; Room 2-143  
Meshing and mesh adaptation, Session 212 Part I; Room 2-146  
Uncertainty in civil engineering and computational mechanics, Session 104 Part I; Room 2-147  
Modeling and solutions for ductile fracture, Session 67 Part I; Room 2-151  
Biomechanics of soft and hard tissues, Session 84 Part III; Room 4-270  
Computational plasticity, Session 101 Part III; Room 4-370  
Nonlinear dynamics and special problems of fluid-structure interactions, Session 20 Part III; Room 10-250  
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**Thursday 9:00am**

**Plenary Lectures**

Chairperson: J.W. Tedesco

**9:00 - 10:30am**

**Room:** Kresge Auditorium (W16)

**Simulations of particle-fluid suspensions with the Lattice-Boltzmann equation**

A.J.C. Ladd, University of Florida

**Applications of computational fluid mechanics at Sandia National Laboratories**

T.C. Bickel and H.C. Morgan, Sandia National Laboratories

**10:30 - 11:00am**

Coffee Break

**Thursday 11:00am - 12:30pm**

Finite/discrete element methods and applications, Session 79 Part I; Room 1-135  
Lattice Boltzmann methods for computational fluid dynamics, Session 63 Part I; Room 1-190  
Turbulence modeling, Session 204 Part I; Room 1-242  
Computational modeling of reacting flow, Session 57 Part I; Room 1-246  
Neural networks and soft methods in computational mechanics, Session 90 Part I; Room 1-273  
Fracture analysis and crack propagation, Session 209 Part I; Room 1-371  
Discontinuous Galerkin methods for PDEs, Session 15 Part V; Room 1-375  
Optimization of expensive black-box cost functions, Session 61 Part I; Room 1-379  
Modeling of the cardiovascular system, Session 13 Part I; Room 2-105  
Advances in algorithms and applications for incompressible and low-Mach number flows, Session 27 Part I; Room 2-131  
Nonlinear dynamics - spanning the scales: Algorithms and applications, Session 38 Part I; Room 2-132  
Analysis for earthquake resistant design, Session 226 Part I; Room 2-135  
Multi-scale modeling of material behavior – Solids, Session 66 Part I; Room 2-136  
Formulations in elasticity, Session 215 Part I; Room 2-139  
Fast boundary element methods and applications, Session 17 Part I; Room 2-142  
Advanced analysis – Solids, Session 26 Part III; Room 2-143  
Computational modeling of ionized gas flows, Session 37 Part I; Room 2-146  
Uncertainty in civil engineering and computational mechanics, Session 104 Part III; Room 2-147  
Methods and modeling for analysis of concrete and related structures, Session 211 Part I; Room 2-151  
Numerical methods for fluid-structure interaction systems, Session 9 Part II; Room 4-270  
Computational plasticity, Session 101 Part V; Room 4-370  
Nonlinear dynamics and special problems of fluid-structure interactions, Session 20 Part V; Room 10-250  
Computational fluid dynamics I, Session 222 Part V; Room 32-123  
Computational fluid dynamics II, Session 200 Part V; Room 32-124  
Multiscale, multiphysics computational fluid dynamics, Session 19 Part I; Room 5-234

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**Friday 9:00am**

**Plenary Lectures**

Chairperson: E.N. Dvorkin

**9:00 - 10:30am**

**Room:** Kresge Auditorium (W16)

**On the treatment of uncertainties in structural mechanics & analysis**

G.I. Schuëller, University of Innsbruck

**Integration of multidisciplinary analysis with Product Lifecycle Management on the Boeing 787**

K.R. Fowler, The Boeing Company

**10:30 - 11:00am**

Coffee Break

**Friday 11:00am - 12:30pm**

Lattice Boltzmann methods for computational fluid dynamics, Session 63 Part III; Room 1-190

Computational modeling of reacting flow, Session 57 Part III; Room 1-246

Computational aspects for the design and the analysis of the Messina Strait Bridge, Session 68 Part I; Room 1-277

Pre-conditioned methods, applications and software environment, Session 32 Part I; Room 1-379

Modeling of the cardiovascular system, Session 13 Part III; Room 2-105

Advances in algorithms and applications for incompressible and low-Mach number flows, Session 27 Part III; Room 2-131

Multi-scale modeling of material behavior – Solids, Session 66 Part III; Room 2-136

Localized drug delivery, Session 49 Part I; Room 2-139

Multi-physics coupling in material processing, Session 76 Part I ; Room 2-146

Numerical methods for fluid-structure interaction systems, Session 9 Part IV; Room 4-270

**Friday 2:00 - 4:00pm**

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Localized drug delivery, Session 49 Part II; Room 2-139

Multi-physics coupling in material processing, Session 76 Part II ; Room 2-146

Numerical methods for fluid-structure interaction systems, Session 9 Part V; Room 4-270

**End of Conference**



## **Chronological List of Sessions (with Details)**

**Each presentation (except for the Plenary Lectures) is scheduled to start at the hour or the half hour,  
and is to last 25 minutes.**

**Lunch is scheduled daily from 12:30-2:00pm.**

**Sessions held in the afternoon include a Coffee Break from 4:00-4:30pm.**



**Tuesday 8:50am**

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**Computational mechanics and natural draft cooling towers: From struggle for safety to designed life-duration**

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**10:30 - 11:00am**

Coffee Break

**Tuesday 11:00am**

**23 - Reliability and robust design, Part I**

Room: 1-135

Chairperson: K.-K. Choi

**Prediction of probabilistic design models for uncertainty propagation**

H.C. Gea

**Replacing RMSE as the terrain roughness standard in Army programs**

D.J. Gorisch and D.A. Lamb

**Experimental testing of methods for decision under uncertainty by simulating engineering and business decisions**

V. Pandey and E. Nikolaidis

**Tuesday 11:00am**

**47 – Advances in the analysis of shells, Part I**

Room: 1-190

Chairpersons: W. Wagner, W.B. Krätzig and S. Klinkel

**Some solutions to the asymptotic bending problem of non-inhibited shells**

D. Choi

**A nonlinear piezoelectric mixed solid shell finite element formulation**

S. Klinkel and W. Wagner

**Reliable finite elements for the analysis of piezoelectric shells**

R. Lammering, F. Yang and S. Mesecke-Rischmann

**Tuesday 11:00am**

**80 - Mechanics of woven fabrics and woven-reinforced composites, Part I**

Room: 1-246

Chairperson: J.-H. He

**Improvement of fiber twisting and crimping in melt-blowing process**

Y.-H. Qu, J.-H. He and Q.-F. Ke

**A brief review on mathematical models for electrospinning**

J.-H. He

**Multi-scale modeling of liquid transport in fibrous materials**

W. Zhong and N. Pan

**TUESDAY**

## TUESDAY

### Tuesday 11:00am

#### **202 - Formulations and algorithms for PDEs, Part I**

Room: 1-273

Chairpersons: C.-N. Chen and D. Mijuca

#### **In-time implicit-explicit algorithm for nonlinear finite element analysis**

J.L.C. Sosa, E. de Souza Neto and D.R.J. Owen

#### **Application of joint time-frequency representation method in transient analysis of semi-infinite media**

A. Farahani and K. Konagai

#### **Efficient absorbing boundary conditions for propagating and evanescent waves in dispersive media**

M.A. Zahid and M.N. Guddati

### Tuesday 11:00am

#### **16 - Meshless and generalized finite element methods, Part I**

Room: 1-277

Chairpersons: S. De, G. Orkisz and V. Kompis

#### **A coupled EFGM-FEM approach for dynamic analyses of a halfspace including nonlinear effects**

J. Quan and O. von Estorff

#### **On higher order approximation in the MFDM method**

J. Orkisz and S. Milewski

#### **On meshfree computations of shells**

S. Skatulla and C. Sansour

### Tuesday 11:00am

#### **94 - Optimal design of bolted joints, Part I**

Room: 1-371

Chairpersons: J. Zarka and F. Maceri

#### **Optimum design of bolted composite lap joints with genetic algorithm**

E. Madenci

#### **Elasto-plastic finite-element-analysis of stress and strain in bolt threads**

R. Seybold and C. Berger

#### **Intelligent optimal design of bolted joints**

J. Zarka, H. Karaouni and J.-M. Monville

### Tuesday 11:00am

#### **25 - Error control and mesh adaptation in FEA, Part I**

Room: 1-375

Chairpersons: T. Grätsch and F. Cirak

#### **Detecting and countering instability in operator splitting methods for reaction-diffusion equations**

D. Estep, T. King, D. Ropp and J. Shadid  
(Keynote)

#### **Error-estimation and adaptivity using operator-customized finite element wavelets**

R. Sudarshan, K. Amaratunga and T. Grätsch

#### **Size functions and mesh generation for high-quality adaptive remeshing**

P.-O. Persson

### Tuesday 11:00am

#### **22 - Optimization - Research and applications, Part I**

Room: 1-379

Chairpersons: F. Duddeck and K.-U. Bletzinger

**Filtering and regularization shape optimization techniques for optimization with CAD-free parametrization**

F. Daoud, N. Camprubi and K.-U. Bletzinger  
(Keynote)

**Design for reliability of stochastic dynamic systems by algebraically derived reduced order models**

G. Weickum, M. Allen and K. Maute

**Towards lifetime optimization of hangar connection plates for steel arch bridges**

M. Baitsch and D. Hartmann

**Tuesday 11:00am**

**15 - Discontinuous Galerkin methods for PDEs, Part I**

Room: 2-105

Chairperson: B. Cockburn

**DGM Seen as Weighted Residuals**

F. Brezzi, B. Cockburn, L.D. Marini and E. Suli  
(Keynote)

**Local post-processing of the discontinuous Galerkin methods for nonuniform mesh**

J.K. Ryan and C.-W. Shu

**High-order RKDG methods for computational electromagnetics**

M.-H. Chen, B. Cockburn and F. Reitich

**Tuesday, 11:00am**

**4 - Advances and applications of computational methods in aerospace, Part I**

Room: 2-131

*Session 1: Unsteady Propulsion*

Chairpersons: J. Bayandor and H.A. Stone

**On swimming paramagnetic filaments**

M. Roper and H.A. Stone  
(Keynote)

**The Ornicopter: A single rotor helicopter without reaction torque - short overview**

Th. Van Holten and N.M. Heiligers

**A revolutionary concept for adaptive unsteady rotor dynamics**

J. Bayandor  
(Keynote)

**Tuesday 11:00am**

**54 - Computational multiscale modeling, Part I**

Room: 2-132

Chairpersons: S.A. Meguid, K.M. Liew, L.S. Ong and T.Y. Ng

**Adaptive variational multiscale methods for elliptic problems**

M.G. Larson and A. Målqvist

**Periodic unit cell-based simulation of materials with random microstructure**

J. Zeman

**Simulations of alternate phases of space-filling graphene crystals under mechanical loads**

P.W. Chung

**TUESDAY**

## TUESDAY

### Tuesday 11:00am

#### **28 - Advanced analysis – Multiphysics, Part I**

Room: 2-135

Chairpersons: J.W. Bull, J.-W. Hong and T. Kalman

#### **Assessment of simulation techniques for rotor loads prediction**

R. Steijl, G. Barakos and K. Badcock

#### **A numerical model of the resistance heating system for material tests on a Gleeble simulator**

K. Solek, Z. Mitura and R. Kuziak

#### **Thermo-mechanical analysis of a four chip CSP microelectronic circuit**

D. Tourtelotte

### Tuesday 11:00am

#### **82 - Advances in computational structural dynamics, Part I**

Room: 2-136

Chairpersons: G. Consolazio, J.W. Tedesco and J.T. Baylot

#### **Explicit Newmark algorithm for rotational dynamics**

P. Krysl

(Keynote)

#### **On direct time integration in large deformation dynamic analysis**

M.M.I. Baig and K.J. Bathe

#### **Transient dynamics analysis over the low and medium frequency ranges for engineering structures**

M. Chevreuil and P. Ladevèze

### Tuesday 11:00am

#### **70 - Computational stochastic mechanics, Part I**

Room: 2-139

Chairpersons: G.I. Schuëller and A. Palmeri

#### **Application of Markov Chain Monte Carlo method for structural reliability**

K. Kolanek

#### **A censored closure for predicting the extreme response of oscillators with non-linear damping**

G. Muscolino and A. Palmeri

#### **A new computational paradigm for the statistics of extreme events in nonlinear random seas**

F. Fedele

### Tuesday 11:00am

#### **77 - Electro-magneto-mechanics of smart structures, Part I**

Room: 2-142

Chairpersons: Y. Shindo, P. Gaudenzi and M.C. Dökmeci

#### **Dynamic bending and domain wall motion in piezoelectric laminated actuators under ac electric fields**

Y. Shindo, F. Narita, M. Mikami and K. Hayashi

(Keynote)

#### **Repair of delaminated beams via piezoelectric patches**

Q. Wang and S.T. Quek

### Tuesday 11:00am

#### **51 - Turbulence modeling for industrial CFD, Part I**

Room: 2-143

Chairperson: B. Basara

**Large eddy simulation in support of RANS modelling**

M.A. Leschziner  
(Keynote)

**RANS models and their application to aerodynamic-type flows**

T.B. Gatski

**A near-wall, SMC-based eddy-viscosity turbulence model designed for engineering flow computations**

S. Jakirlić and B. Basara

**Tuesday 11:00am**

**3 - Discrete and kinetic methods for modeling gas, fluid and ionized media flows, Part I**

Room: 2-146

Chairperson: O. Batishchev

**Kinetic theory and computer simulations of non-equilibrium weak ionized plasma in strong electric field and external sources of ionization**

E. Son  
(Keynote)

**Particle-in-cell simulations of laser-triggered ion acceleration**

G. Dudnikova and T. Liseykina

**Hybrid kinetic method for flows with sharp spatial gradients**

A. Batishcheva, O. Batishchev and J. Fox

**Tuesday 11:00am**

**45 - Modeling coupled and transport phenomena in nanotechnology, Part I**

Room: 2-147

Chairpersons: R. Melnik and A. Povitsky

**Modelling of quantum well semiconductor lasers based on Green's Functions**

M.S. Wartak and P. Weetman

**A general treatment of deformation effects in Hamiltonians for nanoscale systems**

B. Lassen, M. Willatzen and R. Melnik

**A viscous Cahn-Hilliard equation for nanoscale surface evolution in heteroepitaxial thin film growth**

A. Rätz, A. Ribalta and A. Voigt

**Tuesday 11:00am**

**50 - Advances in wave propagation analyses, Part I**

Room: 2-151

Chairperson: C. Zhang and C.-Y. Wang

**Crack problems with a NGF/OQM BEM formulation for the scalar wave equation**

J.C.F. Telles and C.A.R.-V. Tudela  
(Keynote)

**Time-harmonic analysis of a planar crack in an elastic half-space by BEM**

Ch. Zhang, V.V. Mykhas'kiv and V.Z. Stankevych

**Dispersive behavior of waves in a pre-stressed elastic layer with constrained boundaries**

A.C. Wijeyewickrema

**TUESDAY**

## TUESDAY

**Tuesday 11:00am**

**84 - Biomechanics of soft and hard tissues, Part I**

*(In honor of Prof. Sidney Lees)*

Room: 4-270

Chairpersons: F.-J. Ulm and C. Hellmich

**Bounding Uncertainty: computational mechanics used to analyze the structural correlates of early hominid locomotion**

R.B. Eckhardt, K. Galik and J. Kuperavage

(Keynote)

**Finite difference computation: a numerical tool for ultrasonic bone characterization**

P. Laugier, E. Bossy, M. Talmant and F. Padilla

**Investigating the role of molecular interactions on mechanics of bone biomaterials: Molecular dynamics and Fourier transform infrared spectroscopic studies**

K.S. Katti, D.R. Katti, R. Bhowmik and D. Verma

**Tuesday 11:00am**

**101 - Computational plasticity, Part I**

Room: 4-370

Chairpersons: F.J. Montans and R.I. Borja

**Anisotropic pile-up pattern at spherical indentation into a fcc single crystal - finite element analysis versus experiment**

B. Eidel and F. Gruttman

(Keynote)

**Fully implicit numerical integration of a hyperelastoplastic model for sands based on critical state plasticity**

J.E. Andrade and R.I. Borja

**A return mapping algorithm for isotropic and anisotropic large deformations**

Z. Cheng and B. Jeremić

**Tuesday 11:00am**

**20 - Nonlinear dynamics and computational fluid-structure interactions, Part I**

*(in honor of Prof. M. P. Paidoussis)*

Room: 10-250

Chairpersons: M. Amabili and D. Weaver

**Dynamics of clamped-clamped cylinders in axial flow: Theory and experiment**

Y. Modarres-Sadeghi, M.P. Paidoussis, E. Grinevich and C. Semler

(Keynote)

**O(2) symmetry constrained mode interactions in 2D cylinder wake flow**

N.W. Mureithi

**On the application of asymptotic reduction methods of slender structures to fluid-structure interaction problems**

C.E.S. Cesnik and R. Palacios

**Tuesday 11:00am**

**222 - Computational fluid dynamics I, Part I**

Room: 32-123

Chairpersons : S. Ossia, D. Tang and G.J. Sheard

**Nonsimilar solution of unsteady mixed convection flow on a moving slender cylinder**

D. Anilkumar and S. Roy

**Wake mode development of flow past low aspect ratio cylinders**

G.J. Sheard, M.C. Thompson and K. Hourigan



**Tuesday 11:00am**

**200 - Computational fluid dynamics II, Part I**

Room: 32-124

Chairpersons: J. Iannelli and J.-M. Vaassen

**The space-time upwind cell-vertex scheme (STU-CVS) for conservation laws -- a Riemann solver free approach**

S. Tu and S. Aliabadi

(Keynote)

**Three fast computational approximation methods in hypersonic aerothermodynamics**

V.V. Riabov

**High-resolution computational modeling of multi-material flows**

E. Shapiro and D. Drikakis

**Tuesday 11:00am**

**40 - Computational fluid and solid geodynamics: Methods and challenges, Part I**

Room: 5-234

Chairperson: A. Ismail-Zadeh

**Computational basin modelling: a Lagrangian approach**

P. Massimi, F. Saleri and G. Scrofani

**Modeling of block-and-fault dynamics of the lithosphere**

A. Soloviev and A. Ismail-Zadeh

**12:30 - 2:00pm**

Lunch Break

**Tuesday 2:00pm**

**23 - Reliability and robust design, Part IIa**

Room: 1-135

Chairperson: D. Gorsich

**Identifying and cascading probabilistic design targets in complex engineering design**

W. Chen

(Keynote)

**Application of tail model in high safety structure system design**

N.-H. Kim, H. Wang and N.V. Queipo

**Stochastic possibilistic design optimization method for design problems with both statistical and fuzzy input data**

L. Du, K.K. Choi, B.D. Youn and D. Gorsich

**Investigation on robust design optimization for occupant restraint system having highly nonlinear and noisy nature**

B.D. Youn, Y. Fu and R.-J. Yang

**Tuesday 2:00pm**

**47 - Advances in the analysis of shells, Part IIa**

Room: 1-190

Chairpersons: W. Wagner, W.B. Krätzig and S. Klinkel

**Creep influence on structural buckling resistance of concrete shells**

J. Bockhold and Y.S. Petryna

**Asymptotic models of curved interfaces in composite shells**

J.F. Ganghoffer and B. Haussy

**Avoiding geometric locking phenomena in finite element analysis of shells**

K.-U. Bletzinger and M. Bischoff

**TUESDAY**

## TUESDAY

### **Numerical simulation of soil-support interaction as basis for the day-to-day decision process in NATM tunnel excavations**

Y. Spira, R. Lackner and H.A. Mang

**Tuesday 2:00pm**

### **80 - Mechanics of woven fabrics and woven-reinforced composites, Part IIa**

Room: 1-246

Chairperson: J.-H. He and S. Socrate

### **Mechanical properties of a woven fabric**

H. Sun and N. Pan

### **Nonlinear buckling of woven fabrics**

R.D. Anandjiwala and J.W. Gonsalves

### **Analysis of instability in electrospinning**

Y. Wu

### **Digital element method in textile fabric mechanics**

Y. Wang, Y. Miao and D. Swenson

**Tuesday 2:00pm**

### **202 - Formulations and algorithms for PDEs, Part IIa**

Room: 1-273

Chairpersons: C.-N. Chen and D. Mijuca

### **Computational models on graphs for nonlinear hyperbolic and parabolic system of equations**

A.S. Kholodov and Y.A. Kholodov

### **Developments in extended differential quadrature based discrete element analysis methods and time integration schemes**

C.N. Chen

### **About monotonic difference schemes criterions for hyperbolic type equations**

A.S. Kholodov and Y.A. Kholodov

### **Conforming polytope finite elements for soil-structure interaction**

E.A. Malsch

**Tuesday 2:00pm**

### **16 - Meshless and generalized finite element methods, Part IIa**

Room: 1-277

Chairpersons: S. De, G. Orkisz and V. Kompis

### **Meshless domain decomposition schemes for nonlinear elliptic PDEs**

P.P. Chinchapatnam, K. Djidjeli and P.B. Nair

### **On the use of genetic algorithms for numerical integration in meshfree methods**

S. Banihani and S. De

### **Boundary Point Method and its multi-domain formulation**

V. Kompiš and M. Štiavnický

### **An adaptive nodal generation for meshfree method**

H.-J. Chung, G.-H. Lee, W.-H. Lee and T.-Y. Lee

**Tuesday 2:00pm**

### **94 - Optimal design of bolted joints, Part IIa**

Room: 1-371

Chairpersons: J. Zarka and E. Madenci

### **Strength behaviour of aluminium bolts under static and cyclic loading**

C. Berger and U. Arz

**Computational strategy for the analysis of bolted joints taking into account variability**

L. Champaney, P.A. Boucard and S. Guinard

**Components of bending resistant bolted composite joints for high rotation capacity**

C. Odenbreit

**Three-dimensional finite element analysis of viscoelastic composite bolted joints**

A. Caporale, R. Luciano and F. Maceri

**Tuesday 2:00pm**

**25 - Error control and mesh adaptation in FEA, Part IIa**

Room: 1-375

Chairpersons: T. Grätsch and F. Cirak

**Efficient *a posteriori* error estimates for the wave equation**

S. Adjerid

(Keynote)

***A Posteriori* bounds for linear functional outputs of coercive 2nd order PDEs using the local discontinuous Galerkin method**

J.S.H. Wong and J. Peraire

**New recovery based error estimators based on solution enrichment and roughening**

G. Maisano, S. Micheletti, S. Perotto and C.L. Bottasso

**Modal-adaptive structural FEM computations for fluid-structure interaction**

D. Scholz, A. Düster and E. Rank

**Tuesday 2:00pm**

**22 - Optimization - Research and applications, Part IIa**

Room: 1-379

Chairpersons: F. Duddeck and K.-U. Bletzinger

**Crash optimization of car bodies in the concept stage of vehicle development**

K. Volz and F. Duddeck

(Keynote)

**Designing with topology and shape optimization - Closing the loop**

U. Schramm

**Shape optimization for improved vehicle crashworthiness**

R.C. Averill

**Tuesday 2:00pm**

**15 - Discontinuous Galerkin methods for PDEs, Part IIa**

Room: 2-105

Chairperson: C.-W. Shu

**Incompressible velocity approximations for incompressible fluid flow by using DG methods**

D. Schötzau

(Keynote)

**An operator splitting technique for incompressible flows**

B. Riviere

**Locking-free DG methods for Timoshenko beams**

F. Celiker, B. Cockburn, H.K. Stolarski and K.K. Tamma

**Discontinuous Galerkin approximation of eigenvalue problems**

A. Buffa and I. Perugia

**TUESDAY**

## TUESDAY

### Tuesday, 2:00pm

#### **4 - Advances and applications of computational methods in aerospace, Part IIa**

Room: 2-131

*Session 2: Advanced Aerospace Structures*

Chairpersons: J. Bayandor and P. Linde

#### **Environmental effects on the damage behaviour of hybrid composites**

P. Linde

#### **An analytical formulation for the prediction of buckling and post-buckling of composite panels and shells**

C. Bisagni

#### **Experimental investigation of failure in Ti-6Al-4V**

H. Sarsfield, L. Wang and N. Petrinic

#### **High and low velocity impact of composite parts using progressive failure dynamic analysis**

J. Bayandor, F. Abdi, V.S. Sokolinsky, J.M. Starbuck, D.L. Erdman and V. Kunc

### Tuesday 2:00pm

#### **54 - Computational multiscale modeling, Part IIa**

Room: 2-132

Chairpersons: S.A. Meguid, K.M. Liew, L.S. Ong and T.Y. Ng

#### **Computational method for mapping continuum deformations to crystal lattices containing defects**

P.W. Chung and J.D. Clayton

#### **Generalized micro-to-macro transitions of microstructures for the first and second order continuum**

L. Kaczmarczyk

#### **Mechanism-based constitutive modeling of L1-2 crystals**

Y. Yuan and D.M. Parks

#### **A tightly coupled particle-fluid model for DNA-laden flows in complex microscale geometries**

D. Trebotich, G.H. Miller, P. Colella, D.T. Graves, D.F. Martin and P.O. Schwartz

### Tuesday 2:00pm

#### **28 - Advanced analysis – Multiphysics, Part IIa**

Room: 2-135

Chairpersons: J.W. Bull, J.-W. Hong and T. Kalman

#### **Multi-disciplinary simulation, FE CFD and multi-body**

R. Sadeghi

(Keynote)

#### **Multi-Physics simulation of sand erosion phenomena on turbine blade**

M. Suzuki, K. Toda and M. Yamamoto

#### **Analysis of residual stresses during heat treatment of diesel cylinder**

I.-W. Bang, H. Chang and C.-E. Kim

#### **Modeling bed-boundary layer exchange of dissolved and particle associated mercury**

A. Massoudieh, T.R. Ginn and F.A. Bombardelli

### Tuesday 2:00pm

#### **82 - Advances in computational structural dynamics, Part IIa**

Room: 2-136

Chairpersons: G. Consolazio, J.W. Tedesco and J.T. Baylot

**Computational modeling of composite and functionally graded materials**

J. Wang

**Development of a numerically efficient analysis technique for modeling barge to bridge collisions**

D. Gaylord-Cowan and G.R. Consolazio

**Computational examination of fluid-structure interaction problems in dams**

J.L. O'Daniel

**Multi-bodies impacting a deformable structure**

P.P. Papados

**Tuesday 2:00pm**

**70 - Computational stochastic mechanics, Part IIa**

Room: 2-139

Chairpersons: G.I. Schuëller and S.K. Sachdeva

**Observations on Non-Gaussian Karhunen-Loeve expansions**

L.B. Li, S.T. Quek and K.K. Phoon

**Interval finite element analysis of large structures with uncertain parameters**

H. De Gerssem, D. Moens, W. Desmet, D. Vandepitte and K.U. Leuven

**Dimension reduction at most probable point for higher-order reliability analysis**

D. Wei and S. Rahman

**On the analysis of finite deformations and continuum damage in materials with random properties**

S. Acharjee and N. Zabararas

**Tuesday 2:00pm**

**77 - Electro-magneto-mechanics of smart structures, Part IIa**

Room: 2-142

Chairpersons: Y. Shindo, P. Gaudenzi and M.C. Dökmeci

**Stress concentration near the corner point of a magnetoactive 2-D compound wedge**

D. Hasanyan, L. Librescu and Z. Qin

**A thermodynamically consistent formulation for transversely isotropic nonlinear ferroelectric hysteresis**

H. Romanowski and J. Schröder

**Explicit feedback control for a thermal convection loop**

R. Vazquez and M. Krstic

**Free vibration studies of simply supported functionally graded and layered magneto-electro-elastic cylindrical shells**

R.K. Bhangale and N. Ganesan

**Tuesday 2:00pm**

**51 - Turbulence modeling for industrial CFD, Part IIa**

Room: 2-143

Chairperson: B. Basara

**Synergy of RANS and LES: Prospects for high Re and Ra numbers**

K. Hanjalic

(Keynote)

**Partially Averaged Navier-Stokes (PANS) method for turbulence: A seamless RANS to DNS bridging model**

S.S. Girimaji

**TUESDAY**

## TUESDAY

### **Transition modeling for general CFD applications in aeronautics and turbomachinery**

R.B. Langtry and F. R. Menter

### **Advanced turbulence modeling for industrial CFD**

J. Schneider and B. Basara

### **Tuesday 2:00pm**

### **3 - Discrete and kinetic methods for modeling gas, fluid and ionized media flows, Part IIa**

Room: 2-146

Chairperson: O. Batishchev

### **Improved hybrid PIC/MC model for simulating Hall-effect thrusters**

J. Fox, A. Batishcheva, O. Batishchev and M. Martinez-Sanchez

### **Advances in ICRF modeling of VASIMR rocket**

A.V. Ilin, F.R.C. Díaz, J.P. Squire and M.D. Carter

### **Fluid simulation of Hall thruster plumes**

S. Cheng

### **Steady-state, self-consistent kinetic modeling of high-voltage 2-D sheaths in flowing plasmas applied to bare tethers for radiation belt remediation**

É. Choinière and B.E. Gilchrist

### **Tuesday 2:00pm**

### **45 - Modeling coupled and transport phenomena in nanotechnology, Part IIa**

Room: 2-147

Chairpersons: R. Melnik and A. Povitsky

### **Numerical discretization of a fully quantum drift-diffusion model**

P. Degond, S. Gallego and F. Mehats

### **Efficient quantum-mechanical model based on drift-diffusion approach for simulations of modern nanoscale devices**

A. Fedoseyev, A. Przekwas, M. Turowski and M.S. Wartak

### **Transport, growth and stability of disturbances in weakly rarefied channel flows**

F. Fedele and D.L. Hitt

### **Inviscid and viscous CFD modeling of plume dynamics in laser ablation**

K.A. Pathak and A. Povitsky

### **Tuesday 2:00pm**

### **50 - Advances in wave propagation analyses, Part IIa**

Room: 2-151

Chairperson: C. Zhang and A.C. Wijeyewickrema

### **Borehole cuspidal modes and dual arrivals in a transversely isotropic formation**

C.-Y. Wang, R. Burrige, J. Pabon and M. Schoenberg

(Keynote)

### **Simulation of a coupled system of long wave - short waves with a slight detuning in group velocities**

C.K. Poon, D.W.C Lai and K.W. Chow

### **A comparative study on two time-domain BEM/BIEM for transient wave propagation analysis in cracked anisotropic solids**

S. Hirose, C. Zhang and C.-Y. Wang

### **Dynamic Green's functions and time-domain BIE formulations for piezoelectric solids**

C.-Y. Wang and C. Zhang

**Tuesday 2:00pm**

**84 - Biomechanics of soft and hard tissues, Part IIa**

*(In honor of Prof. Sidney Lees)*

Room: 4-270

Chairpersons: F.-J. Ulm and C. Hellmich

**Nanoscaled universal mechanical building blocks and their interactions in biological materials: bone and wood**

C. Hellmich, K. Hofstetter, C. Kober and F.-J. Ulm

(Keynote)

**Simulations of Coupled Mechanics and Transport in Growing Soft Tissue**

H. Narayanan, K. Garikipati, E.M. Arruda and K. Grosh

**A new approach of validation and interpretation of bony organ simulation demonstrated for the case of a human mandible**

C. Kober, B. Erdmann, C. Hellmich, R. Sader and H.-F. Zeilhofer

**3D vessel shape reconstruction using level set method for human atherosclerotic plaques**

Y. Li and D. Tang

**Tuesday 2:00pm**

**101 - Computational plasticity, Part IIa**

Room: 4-370

Chairpersons: F.J. Montans and J.E. Andrade

**A three-invariant hardening cap plasticity for computational modeling of powder compaction process**

A.R. Khoei and A.R. Azami

(Keynote)

**Modeling response of unsaturated silty sand in three-invariant stress space**

L.R. Hoyos and P. Arduino

**Embedding frictional models in an enhanced strain element for modeling failure in geomaterials**

C. Foster, R. Borja and R. Regueiro

**Numerical model for the integration of the elastoplastic potential in finite deformations anisotropic elastoplasticity**

M. Cuomo and M. Fagone

**Tuesday 2:00pm**

**20 - Nonlinear dynamics and computational fluid-structure interactions, Part IIa**

*(in honor of Prof. M. P. Paidoussis)*

Room: 10-250

Chairpersons: B.I. Epureanu and F. Pellicano

**Effects of unsteady aerodynamics on the dynamic response of mistuned bladed disks**

Z. He, B.I. Epureanu and C. Pierre

(Keynote)

**Dynamic instability of circular cylindrical shells**

F. Pellicano and M. Amabili

**Reduced-order modeling of MEMS**

A.H. Nayfeh, M.I. Younis and E.M. Abdel-Rahman

**20 years of FSI experiments in Dundee**

A.S. Tijsseling and A.E. Vardy

**TUESDAY**

## TUESDAY

### Tuesday 2:00pm

#### **222 - Computational fluid dynamics I, Part IIa**

Room: 32-123

Chairpersons : S. Ossia and G.J. Sheard

#### **Numerical approximation of the spectra of Poiseuille flow of two Phan-Thien Tanner liquids**

A.S. Palmer and T.N. Phillips

#### **Fully developed two-phase liquid-liquid flow in finned duct**

E.V. Son, E.N. Tarasova and P.T. Zubkov

#### **Benchmark experimental data for radiative heat transfer prediction**

M.R. Vujčić, N.P. Lavery and S.G.R. Brown

#### **Study of unsteady flow past a circular cylinder using a new computational approach at the outflow boundary**

S.F. Anwer, N. Hassan and S. Sanghi

### Tuesday 2:00pm

#### **200 - Computational fluid dynamics II, Part IIa**

Room: 32-124

Chairpersons: J. Iannelli and H. Kohno

#### **An implicit high order cell-centered finite volume scheme for the solution of three-dimensional Navier-Stokes equations on unstructured grids**

D. Vigneron, J.-M. Vaassen and J.-A. Esers  
(Keynote)

#### **An efficient algorithm for the detection of neighbouring particles: prediction of the behaviour of a bubbling fluidised bed**

M. Chiesa and Jens A. Melheim

#### **On the flow-condition-based interpolation approach for incompressible fluids**

H. Kohno and K.J. Bathe

#### **The force/work differencing of exceptional points in the compatible formulation of Lagrangian hydrodynamics**

E. Caramana and R. Loubere

### Tuesday 2:00pm

#### **40 - Computational fluid and solid geodynamics: Methods and challenges, Part IIa**

Room: 5-234

Chairperson: H. Mühlhaus

#### **Computational models of magma dynamics in subduction zones**

R.F. Katz, M. Spiegelman, M. Knepley and B. Smith

#### **Mixing in a convecting viscous fluid: Application to Earth's mantle**

J.B. Naliboff and L.H. Kellogg

#### **Stirring in 3-D spherical models of convection in the Earth's mantle**

K. Gottschaldt, U. Walzer, R. Hendel, D. Stegman, J. Baumgardner and H. Mühlhaus

#### **Numerical reconstruction of the initial temperature of diapiric structures in the Earth: Effect of the heat diffusion**

A. Ismail-Zadeh, A. Korotkii, G. Schubert and I. Tsepelev

### 4:00 - 4:30pm

Coffee Break



**Tuesday 4:30pm**

**23 - Reliability and robust design, Part IIb**

Room: 1-135

Chairperson: P. Decker and N. Hoyle

**Critical stochastic modeling aspects for reliability prediction of complex vehicle systems**

D.M. Ghiocel

**Load tolerance estimation in fatigue reliability design**

H. Wang, N.-H. Kim and Y.-J. Kim

**A new approach for system reliability-based design optimization**

M.A. Ba-abbad, R.K. Kapania and E. Nikolaidis

**Tuesday 4:30pm**

**47 – Advances in the analysis of shells, Part IIb**

Room: 1-190

Chairpersons: W. Wagner, W.B. Krätzig and S. Klinkel

**Structural performance of foam-filled metal sandwich plates under quasi-static and dynamic loadings**

A. Vaziri, Z. Xue and J.W. Hutchinson

**Modeling resin infusion of composite sandwich structures by the VARTM process**

X. Song, A.C. Loos, B.W. Grimsley and R.J. Cano

**A precis on computational mechanics of functionally graded beams, plates and shells**

T. Kant and C.V. Subbaiah

**Study of interaction curves for composite laminate with cutout**

V. Anil, C.S. Upadhyay and N.G.R. Iyengar

**Tuesday 4:30pm**

**80 - Mechanics of woven fabrics and woven-reinforced composites, Part IIb**

Room: 1-246

Chairperson: S. Socrate

**A micromechanical model for the onset of tearing at slits in stressed coated woven fabrics**

T.A. Godfrey, J.N. Rossettos and S.E. Bosselman

**A study of the thermostamping process for a woven-fabric composite**

X. Li, J.A. Sherwood, J.L. Gorczyca, J. Chen and L. Liu

**Computational modelling of textile composites for industry**

P. de Luca and A.K. Pickett

**Micromechanical modelling of compaction of woven fabric preforms**

Z.-R. Chen and L. Ye

**Tuesday 4:30pm**

**202 - Formulations and algorithms for PDEs, Part IIb**

Room: 1-273

Chairpersons: C.-N. Chen and D. Mijuca

**Discontinuous Galerkin spectral element simulation of a type of wave propagation with large source items**

S. Mao and C.A. Luongo

**A multi-time-step coupling method for structural dynamics**

A. Prakash and K.D. Hjelmstad

**A finite-element alternative to infinite elements**

M.N. Guddati

**TUESDAY**

## TUESDAY

### Tuesday 4:30pm

#### **16 - Meshless and generalized finite element methods, Part IIb**

Room: 1-277

Chairpersons: S. De, G. Orkisz and V. Kompis

#### **On the use of hybrid finite element – wave based methods for steady-state acoustic analysis**

B. Pluymers, W. Desmet, D. Vandepitte and P. Sas

#### **A wavelet based spectral finite element for analysis of coupled wave propagation in composite beam**

M. Mitra and S. Gopalakrishnan

### Tuesday 4:30pm

#### **94 - Optimal design of bolted joints, Part IIb**

Room: 1-371

Chairpersons: J. Zarka and E. Madenci

#### **Bolted and pin joints in solid rocket boosters**

V. Sivakumar, R. Palaninathan, A.Y. Arasu, T. Kurian and S. Murugesan

### Tuesday 4:30pm

#### **25 - Error control and mesh adaptation in FEA, Part IIb**

Room: 1-375

Chairpersons: T. Grätsch and F. Cirak

#### **Structured adaptive mesh refinement in the virtual test facility**

R. Deiterding

#### **Reduced-basis approximation and *a posteriori* error estimation for Navier-Stokes**

S. Deparis, K. Veroy, G. Rozza and A.T. Patera

#### **On goal-oriented error estimation in practical finite element analysis**

T. Grätsch and K.J. Bathe

### Tuesday 4:30pm

#### **22 - Optimization - Research and applications, Part IIb**

Room: 1-379

Chairpersons: F. Duddeck and K.-U. Bletzinger

#### **Multidisciplinary optimisation of a vehicle systems using geometrical parameters**

C. Baeuerle

(Keynote)

#### **Constrained multi-objective performance optimization of structures using a gradient-based algorithm**

C.J.K. Lee, T. Furukawa and H. Noguchi

#### **Shape optimization of an IC-engine maniverter design under structural, fluid dynamic and cost aspects**

M. Usan and H. Wenzel

### Tuesday 4:30pm

#### **15 - Discontinuous Galerkin methods for PDEs, Part IIb**

Room: 2-105

Chairperson: S. Adjerid

#### **Domain decomposition preconditioners for C- $\theta$ interior penalty methods**

S.C. Brenner and K. Wang

#### **A new discontinuous Galerkin method for Hamilton-Jacobi equations**

S. Osher and J. Yan

**An interior penalty method for the reduced time-harmonic Maxwell equations**

F. Li, S.C. Brenner and L.-Y. Sung

**Tuesday, 4:30pm**

**4 - Advances and applications of computational methods in aerospace, Part IIb**

Room: 2-131

*Session 3: Control*

Chairpersons: J. Bayandor and C. Bisagni

**Real time prediction of ship motion using artificial neural networks**

A.A. Khan, C. Bil and K.E. Marion

**Computational procedures for the simulation of maneuvers**

C.L. Bottasso, A. Croce, D. Leonello and L. Riviello

**Sequential quadratic programming in optimal forced landing trajectory with obstacle avoidance in atmospheric disturbances**

S. Prasad, P. Tong and C. Bil

**Tuesday 4:30pm**

**54 - Computational multiscale modeling, Part IIb**

Room: 2-132

Chairpersons: S.A. Meguid, K.M. Liew, L.S. Ong and T.Y. Ng

**Micromechanics of axial tensile deformation in micro-layered ductile/brittle polymeric laminates**

R. Sharma, S. Socrate and M.C. Boyce

**Nonlinear modeling of historical masonry structures on meso-scale**

J. Novák

**Linking Meso- and Macroscale simulations: crystal plasticity of HCP metals & yield surface**

S. Graff

**Tuesday 4:30pm**

**28 - Advanced analysis – Multiphysics, Part IIb**

Room: 2-135

Chairpersons: J.W. Bull, J.-W. Hong and T. Kalman

**Restoration of original ecosystem in the part of Aral sea**

I. Atabekov

**Tuesday 4:30pm**

**82 - Advances in computational structural dynamics, Part IIb**

Room: 2-136

Chairpersons: G. Consolazio, J.W. Tedesco and J.T. Baylot

**Coupled Euler-Lagrange modeling of buried structure response to blast loading**

G.C. Bessette

**On the numerical computation of strain softening in explicit dynamic finite element analysis**

K.T. Danielson and M.D. Adley

**A methodology for modeling the response of steel cables to blast loads**

D. Pelssone, J.C. Ray and J.T. Baylot

**Tuesday 4:30pm**

**70 - Computational stochastic mechanics, Part IIb**

Room: 2-139

Chairpersons: G.I. Schuëller and D. Wei

**TUESDAY**

## TUESDAY

### **Bounds on structural system reliability in the presence of interval variables**

P.R. Adduri, R.C. Penmetsa and R.V. Grandhi

### **A new projection scheme for linear stochastic problems**

S.K. Sachdeva, P.B. Nair and A.J. Keane

**Tuesday 4:30pm**

### **77 - Electro-magneto-mechanics of smart structures, Part IIb**

Room: 2-142

Chairpersons: Y. Shindo, P. Gaudenzi and M.C. Dökmeci

### **Vibrations of an axially graded porous piezoelectric ceramic rod**

G. Altay and M.C. Dökmeci

(Keynote)

### **Gap waves in ferro-magneto-elastic materials**

D. Hasanyan, P. Marzocca and S. Harutyunyan

**Tuesday 4:30pm**

### **51 - Turbulence modeling for industrial CFD, Part IIb**

Room: 2-143

Chairperson: B. Basara

### **Accounting for near-wall effects in an explicit algebraic stress model using elliptic blending**

G. Karlatiras and G. Papadakis

### **Compound wall treatment for RANS computation of complex turbulent flows**

M. Popovac and H. Hanjalic

### **On the application of symmetry methods turbulence modelling**

S. Guenther and M. Oberlack

### **Matching pursuit with POD dictionaries in the analysis of 2D turbulence signals and images**

Ch. H. Bruneau, P. Fischer, Z. Peter and A. Yger

**Tuesday 4:30pm**

### **3 - Discrete and kinetic methods for modeling gas, fluid and ionized media flows, Part IIb**

Room: 2-146

Chairperson: O. Batishchev

### **Modeling of a local radiation shielding for special conditions**

V.V. Tselikov, A.V. Ilyin, V.K. Papin and Y.Y. Kloss

### **Kinetic simulation of mixed-collisional gas flows in thrusters**

O. Batishchev and A. Batishcheva

### **Superconducting magnet technology at Kurchatov Institute**

V.E. Keilin

### **Tsunami wave transportation as effect of the self-consistent capture of water by gravitational wave**

B. V. Alexeev

**Tuesday 4:30pm**

### **45 - Modeling coupled and transport phenomena in nanotechnology, Part IIb**

Room: 2-147

Chairpersons: R. Melnik and A. Povitsky

**A computational heat transfer and fluid dynamics model for laser ablation of carbon**

N. Mullenix and A. Povitsky

**2D modeling of carrier transport through semiconductor heterostructure nanowires**

N. Radulovic, M. Willatzen, R.V.N. Melnik, L.C. Lew Yan Voon

**A computational approach to direct simulation of realistic sized single and multiwall carbon nanotubes**

A. Pantano, D.M. Parks, M.C. Boyce and M. Nardelli

**Forced convection in microducts: Effects of initial conditions and disturbances**

L. Wang

**Tuesday 4:30pm**

**50 - Advances in wave propagation analyses, Part IIb**

Room: 2-151

Chairperson: C. Zhang and A.C. Wijeyewickrema

**2D time domain boundary element analysis of an anisotropic piezoelectric solid with a finite crack**

A. Tan, S. Hirose and C. Zhang

**Tuesday 4:30pm**

**84 - Biomechanics of soft and hard tissues, Part IIb**

*(In honor of Prof. Sidney Lees)*

Room: 4-270

Chairpersons: F.-J. Ulm and C. Hellmich

**Sensitivity analysis of 3D MRI-based models with fluid-structure interactions for human atherosclerotic coronary and carotid plaques**

D. Tang, C. Yang, J. Zheng, P.K. Woodard, G.A. Sicard, J.E. Saffitz and C. Yuan

**Modeling of anisotropic hyperelasticity and discontinuous damage in arterial walls based on polyconvex stored energy functions**

D. Balzani, J. Schröder and D. Gross

**Multi objective shape optimization of the human carotid artery**

K.V. Bhaskar, N.W. Bressloff and P.B. Nair

**Tuesday 4:30pm**

**101 - Computational plasticity, Part IIb**

Room: 4-370

Chairpersons: F.J. Montans and J.E. Andrade

**An embedded cohesive crack model for fracture of quasi-brittle materials**

J.M. Sancho, J. Planas, J.C. Gálvez, E. Reyes and D.A. Cendón  
(Keynote)

**Strain localization analysis for fast transient dynamics in thermoplastic solids using a strong discontinuity approach**

I.M. Díaz and J.J.L. Cela

**Rheological-dynamical analogy: Cyclic visco-plasticity and constant amplitude fatigue**

D.D. Milašinović

**Tuesday 4:30pm**

**TUESDAY**

## TUESDAY

### **20 - Nonlinear dynamics and computational fluid-structure interactions, Part IIb**

*(in honor of Prof. M. P. Paidoussis)*

Room: 10-250

Chairpersons: E.H. Dowell and J. Horáček

### **Experimental/theoretical correlation study of nonlinear aeroelasticity for a wing-store model with freeplay**

D. Tang, P.J. Attar and E.H. Dowell

(Keynote)

### **Numerical simulation of human voice production using aeroelastic model of self-oscillations of the vocal folds and FE model of the vocal tract**

J. Horáček, P. Šidlof, J.G. Švec and F. Griffond-Boitier

### **Concurrent multi-scale and multi-physics simulations of biological systems**

X.S. Wang

**Tuesday 4:30pm**

### **222 - Computational fluid dynamics I, Part IIb**

Room: 32-123

Chairperson: S. Ossia and G.J. Sheard

### **3D numerical modelling of curved open channel using nonhydrostatic turbulent finite element solver for free-surface flows**

C. Leupi, E. Miglio and M.S. Altinakar

### **Compressible effects on ice particle growth in turbulent jets**

E. Maglaras and F. Garnier

### **Numerical investigation of the flow instability in the rotating cavities**

E. Tuluszka-Sznitko, E. Serre and P. Bontoux

### **Simulation of polymer flow in rotating die-slot**

A. Rawal and P.J. Davies

**Tuesday 4:30pm**

### **200 - Computational fluid dynamics II, Part IIb**

Room: 32-124

Chairpersons: J. Iannelli and J.-M. Vaassen

### **A new numerical scheme for transonic flows with shape flexibility and memory efficiency using CIP-MLSM with HGA method**

T. Jimbo and T. Tanahashi

### **A nodal high-order spectral finite volume shallow water model on the cubed-sphere**

V. Cheruvu, R.D. Nair and H.M. Tufo

### **Bubble function application in the finite element modelling of flow through a highly permeable porous medium**

M. Parvazinia and V. Nassehi

**Tuesday 4:30pm**

### **40 - Computational fluid and solid geodynamics: Methods and challenges, Part IIb**

Room: 5-234

Chairperson: A. Ismail-Zadeh

### **Non-Newtonian effects in simple models of mantle convection**

H.-B. Mühlhaus, M. Davies, L. Gross and L. Moresi

### **Challenges in the visualization of a 2D mantle dynamics simulation using one billion tracers**

M.L. Rudolph, T.V. Gerya and D.A. Yuen

**Three-dimensional numerical simulations of thermo-chemical  
multiphase convection in Earth's mantle**

T. Nakagawa and P.J. Tackley

**TUESDAY**

## WEDNESDAY

### Wednesday 9:00am

**Plenary Lectures**  
Chairperson: F. Brezzi

**9:00 - 10:30am**

**Room:** Kresge Auditorium (W16)

**Open problems in elasticity**  
J.M. Ball, University of Oxford

**Fundamental and applicative challenges in the modeling and computations of shells**  
D. Chapelle, INRIA-Rocquencourt

**10:30 - 11:00am**

Coffee Break

### Wednesday 11:00am

**23 - Reliability and robust design, Part III**  
Room: 1-135  
Chairpersons: D. Gorsich

**Design optimization of an engine air intake**  
N. Hoyle, N.W. Bressloff and A.J. Keane

**Robust design of nonlinear transient dynamic problems by the optimal location of structural fuses**  
S. Missoum

**Morphing technology on design and development process of a vehicle**  
H.-G. Kim and J.-W. Jeon

### Wednesday 11:00am

**47 – Advances in the analysis of shells, Part III**  
Room: 1-190  
Chairpersons: W. Wagner, W.B. Krätzig and S. Klinkel

**Numerical simulation on propagation of singularities through edges in thin hyperbolic shells**  
P. Karamian-Surville

**A parametric study of bulging factors for unstiffened and stiffened cylindrical shells**  
C.H. Furukawa, M.L. Bucalem and C.E. Chaves

**Nonlinear vibrations of viscoelastic orthotropic plates of composite materials**  
B.H. Eshmatov

### Wednesday 11:00am

**92 - Interface capturing and multi-fluid dynamics, Part I**  
Room: 1-242  
Chairpersons: T. Yabe and F. Xiao

**Simulating liquid interfaces interacting with thin solid shells**  
E. Guendelman, A. Selle, F. Losasso and R. Fedkiw  
(Keynote)

**Modeling of three-dimensional bubbly flows with a mass-conserving level-set method**  
S. P. van der Pijl and A.S.C. Vuik

**A FEM Navier-Stokes solver coupled to a front-tracking algorithm for two-phase flows**  
S. Manservigi, E. Aulisa, M. Marra and R. Scardovelli



**Wednesday 11:00am**

**80 - Mechanics of woven fabrics and woven-reinforced composites, Part III**

Room: 1-246

Chairperson: S. Socrate

**Multi-scale modelling of woven fabrics with 3D elastica**

P. Potluri and R. Ramgulam

**A solid mechanics shear model of commingled glass/polypropylene woven fabrics**

L. Liu and J. Chen

**Continuum modeling of woven fabrics**

M.J. King and S. Socrate

**Wednesday 11:00am**

**202 - Formulations and algorithms for PDEs, Part III**

Room: 1-273

Chairpersons: C.-N. Chen and D. Mijuca

**On a new multifield finite element approach in a semi-coupled thermo-mechanical analysis**

D. Mijuca

**On the low order tests of the novel mixed finite element in steady state heat transfer analysis**

B. Medjo and D. Mijuca

**Wednesday 11:00am**

**16 - Meshless and generalized finite element methods, Part III**

Room: 1-277

Chairpersons: S. De, G. Orkisz and V. Kompis

**Softening cohesive interface analysis via boundary integral equations**

M. Dilligenti and F. Freddi

**Free-Lagrange simulations of plastic deformation in aluminium induced by shock-bubble interaction**

C.K. Turangan

**A hybrid element-free Galerkin and natural element meshfree method for direct imposition of essential boundary conditions and faster three-dimensional computations**

J. Yvonnet and F. Chinesta

**Wednesday 11:00am**

**48 - Vortex dominated flows - Computational, analytical and experimental studies of viscous or inviscid vortical flows and applications, Part I**

Room: 1-371

Chairpersons: E. Krause, L. Ting and D. Blackmore

**Breakdown revisited**

E. Krause

(Keynote)

**Fuel-stratification in automotive DI-engines with vortical flow structures - development process with numerical and experimental methods**

A. Abdelfattah, W. Kern, J. Fischer, B. Durst, E. Schuenemann, C. Landerl and C. Schwarz

**Influence of the vortical wake behind wind turbines using a coupled Navier-Stokes/vortex-panel methodology**

S. Schmitz and J.-J. Chattot

**WEDNESDAY**

## WEDNESDAY

### Wednesday 11:00am

#### **25 - Error control and mesh adaptation in FEA, Part III**

Room: 1-375

Chairpersons: T. Grätsch and F. Cirak

#### **Adaptive simulation of multiphysics problems**

M.G. Larson

(Keynote)

#### **The shift of Green's functions and the domain of influence**

F. Hartmann and T. Kunow

#### **Combined discretization and model errors in computational meso-macro-scale material modeling**

F. Larsson and K. Runesson

### Wednesday 11:00am

#### **22 - Optimization - Research and applications, Part III**

Room: 1-379

Chairpersons: F. Duddeck and K.-U. Bletzinger

#### **Topology optimization using the finite volume method**

A. Gersborg-Hansen, M.P. Bendsøe and O. Sigmund

(Keynote)

#### **Evolutionary shape optimization of plates with reinforcements**

R. Górski and P. Fedeliński

#### **Shape optimization algorithms using wavelet-based BEM**

K. Eppler

### Wednesday 11:00am

#### **15 - Discontinuous Galerkin methods for PDEs, Part III**

Room: 2-105

Chairperson: D. Schötzau

#### ***A posteriori* error estimates and adaptive methods for a discontinuous Galerkin method**

O. Karakashian and F. Pascal

(Keynote)

#### **Superconvergence of the local discontinuous Galerkin method applied to diffusion problems**

S. Adjerid and D. Issaev

#### **Superconvergence of hp-Discontinuous Galerkin methods for convection-diffusion problems**

F. Celiker and B. Cockburn

### Wednesday, 11:00am

#### **4 - Advances and applications of computational methods in aerospace, Part III**

Room: 2-131

#### *Session 4: Numerical Modelling*

Chairpersons: J. Bayandor and N. Kolev

#### **Thermal fluid-structure interaction on re-entry vehicles TPS**

S. Borreca, G. Tumino and P. Gaudenzi

#### **Gas release driven dynamics in research reactors piping**

N. Kolev, I. Roloff-Bock and G. Schlicht

#### **Interlaminar damage analysis and prediction in aerospace composite replacement panels**

J. Bayandor, R.S. Thomson, P.J. Callus and M.L. Scott

### Wednesday 11:00am

**54 - Computational multiscale modeling, Part III**

Room: 2-132

Chairpersons: S.A. Meguid, K.M. Liew, L.S. Ong and T.Y. Ng

**Constitutive modeling of the stress-stretch behavior of membranes possessing a triangulated network microstructure**

M. Arslan, M.C. Boyce

**Stress-driven material migration in Cu interconnects during thermal annealing**

V. Grychanyuk, I. Tsukrov and T.S. Gross

**Influence of continuous nucleation of secondary voids upon growth and coalescence of cavities in porous ductile materials**

K. Enakoutsa, J.-B. Leblond and B. Audoly

**Wednesday 11:00am**

**28 - Advanced analysis – Multiphysics, Part III**

Room: 2-135

Chairpersons: Chairpersons: J.W. Bull, J.-W. Hong and T. Kalman

**Validation process for road noise analysis**

J.-U. Lee, J.-K. Suh and S.-K. Jeong

**A fast matrix-free implicit unstructured-hybrid algorithm for modelling non-linear heat conduction**

A.G. Malan and J.P. Meyer

**Wednesday 11:00am**

**91 - Discretization methods with finite volumes, discontinuous Galerkin methods and the application in porous media, Part I**

Room: 2-136

Chairperson: J. Geiser

***A posteriori* error estimates for the heterogeneous multiscale finite element method for elliptic homogenization problems**

M. Ohlberger

**Operator-splitting methods for transport equations with nonlinear reactions**

R.E. Ewing, J. Geiser and J. Liu

**Modified discretization methods with embedded analytical solutions based on Finite Volume and Discontinuous Galerkin Methods and some applications in porous media**

J. Geiser

**Wednesday 11:00am**

**70 - Computational stochastic mechanics, Part III**

Room: 2-139

Chairpersons: G.I. Schuëller and D. Wei

**The interval finite element method for static structural analysis**

L. Farkas, D. Moens and D. Vandepitte

**Numerical Karhunen-Loève expansion of a covariance function on a multidimensional domain via finite elements method**

S. Recek, M. Lemaire and A. Millard

**A formulation for evaluation of uncertain response due to multiple uncertain material properties in in-plane and plate structures**

H.C. Noh

**Wednesday 11:00am**

**77 - Electro-magneto-mechanics of smart structures, Part III**

Room: 2-142

Chairpersons: Y. Shindo, P. Gaudenzi and M.C. Dökmeci

**WEDNESDAY**

## WEDNESDAY

### **A nonlinear piezoelectric 3D-beam finite element formulation**

A. Butz, S. Klinkel and W. Wagner

### **Damping properties of steel frame equipped with traditional and shape-memory alloy braces**

D. Fugazza

### **Optimal control using second order automatic differentiation**

M. Furumi and M. Kawahara

**Wednesday 11:00am**

### **26 - Advanced analysis – Solids, Part I**

Room: 2-143

Chairpersons: C. Gantes, M.L. Bucalem and M. Kaminski

### **Towards physically based failure criteria of fibrous composites. A micromechanical study**

F. París, V. Mantic and E. Correa

(Keynote)

### **Positional description for nonlinear 2-D static and dynamic frame analysis by FEM with Reissner kinematics**

D.N. Maciel and H.B. Coda

**Wednesday 11:00am**

### **212 - Meshing and mesh adaptation, Part I**

Room: 2-146

Chairpersons: C. Hüttig and M.M.I. Baig

### **Quadrilateral mesh adaptation by area functional**

S.K. Khattri

### **A Laplacian-based grid manipulator for ALE calculations in screw compressors**

J. Vande Voorde, J. Vierendeels and E. Dick

**Wednesday 11:00am**

### **104 - Uncertainty in civil engineering and computational mechanics, Part I**

Room: 2-147

Chairpersons: B. Möller and S. Chen

### **Inclusion properties for random relations under the hypothesis of stochastic independence and non-interactivity**

S. Chen and F. Tonon

### **Reliability evaluation using nonlinear finite element method under dynamic loading**

A. Haldar and J. Huh

### **Stochastic analysis of steady-state aeroelastic instabilities**

M. Löhner and D. Dinkler

**Wednesday 11:00am**

### **67 - Modeling and solutions for ductile fracture, Part I**

Room: 2-151

Chairperson: L. Zheng

### **A review of advances in mixed mode ductile fracture**

X. Deng and M.A. Sutton

### **A relation for mesh size effect in ductile fracture**

D.G. Karr and Y. Li

### **Development and calibration of a new 3-D fracture criterion for ductile metals**

T. Wierzbicki, Y. Bao, Y.-W. Lee and Y. Bai

**Wednesday 11:00am**

**84 - Biomechanics of soft and hard tissues, Part III**

*(In honor of Prof. Sidney Lees)*

Room: 4-270

Chairpersons: F.-J. Ulm and C. Hellmich

**A nature-inspired model for fibre-reinforced membranes at finite strains**

B. Chiaia and M. Borri-Brunetto

**FSI model of the spinal cord and implications for syringomyelia**

E. Kyriakou, L. Bilston, M. Stoodley and A. Brodbelt

**Finite element model of the lung and chest wall to predict internal motion**

E. Kyriakou, P.A. Robinson, R. Fulton and C. Baldock

**Wednesday 11:00am**

**101 - Computational plasticity, Part III**

Room: 4-370

Chairpersons: F.J. Montans and R.I. Borja

**Intrinsic stress computation and algorithm linearization for isotropic plasticity models**

N. Valoroso

**Continuum Model for Metal Sandwich Cores**

Z. Xue, A. Vaziri and J.W. Hutchinson

**Applications of planar isotropic yield criteria to porous sheet metal under a deep drawing simulation**

K.-C. Liao

**Wednesday 11:00am**

**20 - Nonlinear dynamics and computational fluid-structure interactions, Part III**

*(in honor of Prof. M. P. Païdoussis)*

Room: 10-250

Chairpersons: P.B. Gonçalves and M. P. Païdoussis

**Large amplitude vibrations of doubly curved shallow shells**

M. Amabili

(Keynote)

**Non-linear modal interactions in free-edge thin spherical shells: measurements of a 1:1:2 internal resonance**

O. Thomas, É. Luminais and C. Touze

**Nonlinear vibrations of clamped circular cylindrical shells**

K.N. Karagiozis, M. Amabili, M.P. Païdoussis and A.K. Misra

**Wednesday 11:00am**

**222 - Computational fluid dynamics I, Part III**

Room: 32-123

Chairpersons : S. Ossia, D. Tang and G.J. Sheard

**Flowing into the mainstream: The emerging role of CFD in CAE and PLM**

D.A. Nagy

(Keynote)

**Axisymmetric model for finite element analysis of particle transport on rotating flow**

S.P. Ferro, M.E.C. Cardozo and M.B. Goldschmit

**Determining bed shear stress distributions in a rotating circular flume using ADINA-F model**

C. Inkratas, A. Fata, B. Gharabaghi, B.G. Krishnappan and C. He

**WEDNESDAY**

## WEDNESDAY

**Wednesday 11:00am**

**200 - Computational fluid dynamics II, Part III**

Room: 32-124

Chairperson: J. Iannelli and H. Kohn

**Higher order weighted compact scheme**

M.L.B. Oliveira

(Keynote)

**A locally conservative projection scheme for incompressible flow**

B. Bejanov, J-L. Guermond, and P.D. Minev

**Wednesday 11:00am**

**40 - Computational fluid and solid geodynamics: Methods and challenges, Part III**

Room: 5-234

Chairperson: P. Tackley

**Planetary and stellar dynamo simulations: methods and examples**

G.A. Glatzmaier

**Application of grid computation to numerical geodynamo simulation**

W. Kuang

**Control volume approach to the geodynamo**

M. Reshetnyak

**12:30 - 2:00pm**

Lunch Break

**Wednesday 2:00pm**

**23 - Reliability and robust design , Part IV**

Room: 1-135

Chairperson: K.-K. Choi and N. Hoyle

**Using computational models with different levels of abstraction to design a new borehole sonic logging tool**

J. Pabon, C.-J. Hsu, and H. Sugiyama

**Optimal design of a lightweight fiber reinforced composite robotic manipulator**

G. Qi and L.B. Lessard

**Wednesday 2:00pm**

**47 – Advances in the analysis of shells, Part IVa**

Room: 1-190

Chairpersons: W. Wagner, W.B. Krätzig and S. Klinkel

**Thermal buckling and dynamic analysis of functionally graded truncated conical shells conveying hot liquid sodium**

R.K. Bhangale and N. Ganesan

**Assumed thickness and shear strain shell element for incompressible hyperelastic analysis**

M. Tanaka and H. Noguchi

**Variational formulation and numerical treatment of a surface-related solid-shell element**

R. Schlebusch and B.W. Zastrau

**Free vibration of a plate with crack: Inverse problem**

T. Yeghiazaryan

**Wednesday 2:00pm**

**92 - Interface capturing and multi-fluid dynamics, Part II**

Room: 1-242

Chairpersons: T. Yabe and F. Xiao

**Description of complex bodies by almost mesh-free Soroban Grid**

T. Yabe

**Development of Front Tracking Method and its application to Computational Fluid Dynamics**

B. Fix, J. Glimm, X. Jia and X. Li

**Numerical method for moving solid objects in flows**

K. Yokoi

**A robust and practical numerical model for multi-fluid simulations**

F. Xiao

**Wednesday 2:00pm**

**80 - Mechanics of woven fabrics and woven-reinforced composites, Part IV**

Room: 1-246

Chairperson: J.F. Ganghoffer

**Nonlinear behavior of 3D regular and irregular open cell structures**

M.H. Luxner, J. Stampfl and H.E. Pettermann

**FEA of the high strain mechanical response of a wet Kelvin model of a polyurethane open-cell foam**

N.J. Mills

**Wednesday 2:00pm**

**202 - Formulations and algorithms for PDEs, Part IV**

Room: 1-273

Chairpersons: C.-N. Chen and D. Mijuca

**A comparison of mixed-enhanced finite elements**

R. Piltner and L. Li

**High accuracy numerical methods for incompletely parabolic problems in fluid dynamics I: Formulation**

M.M. Cecchi and M.A. Pirozzi

**Stochastic generalized differential quadrature formulation**

M. Meštrović

**Wednesday 2:00pm**

**48 - Vortex dominated flows - Computational, analytical and experimental studies of viscous or inviscid vortical flows and applications, Part IIa**

Room: 1-371

Chairpersons: E. Krause, L. Ting and D. Blackmore

**Numerical analysis of two distinct types of vortex dislocations in wake-type flows with different spanwise nonuniformities**

G.C. Ling and J.Y. Niu

(Keynote)

**Monte Carlo simulations of Baroclinic vortices**

S.M. Assad and C.C. Lim

**Numerical analysis of 3D lid-driven cavity flows with different spanwise aspect ratios**

K. Ishii, T. Nihei and S. Adachi

**On the influence of diabatic effects on the motion of 3D - mesoscale vortices within a baroclinic shear flow**

E. Mikusky, A.Z. Owinoh and R. Klein

**WEDNESDAY**

## WEDNESDAY

### Wednesday 2:00pm

#### **25 - Error control and mesh adaptation in FEA, Part IVa**

Room: 1-375

Chairpersons: T. Grätsch and F. Cirak

#### ***A posteriori* error estimates based on polynomial gradient recovery**

Z. Zhang

(Keynote)

#### **Variational mesh adaptation methods using balance of space-time configurational forces**

G. Zielonka and M. Ortiz

#### ***A posteriori* error control in a parallel finite element code**

C.K. Newman, K.D. Copps, and S.W. Bova

#### **Recent results in *a posteriori* error estimation for solid dynamics**

I. Romero and L.M. Lacoma

### Wednesday 2:00pm

#### **22 - Optimization - Research and applications, Part IV**

Room: 1-379

Chairpersons: F. Duddeck and K.-U. Bletzinger

#### **Comparative studies of two PDD methods for airfoil design optimization**

X. Cai and F. Ladeinde

#### **Structural topology optimization using a moving superimposed finite element method**

S. Wang, M.Y. Wang, Q. Xia and S. Chen

#### **Optimising thickness profiling of plate structures**

W.C. Christie and J.W. Bull

### Wednesday 2:00pm

#### **15 - Discontinuous Galerkin methods for PDEs, Part IVa**

Room: 2-105

Chairperson: J.-F. Remacle

#### **The heterogeneous multi-scale method based on the discontinuous Galerkin and the finite volume methods for hyperbolic problems**

S. Chen, E. Weinan and C.-W. Shu

(Keynote)

#### **Superconvergence of linear functionals by discontinuous Galerkin approximations**

B. Cockburn and D. Ichikawa

#### **A high-order limiter for the discontinuous Galerkin method**

L. Krivodonova

#### **An hp-adaptative space-time discontinuous Galerkin method for free boundary problems**

J.J. Sudirham, J.J.W. van der Vegt and R.M.J van Damme

### Wednesday, 2:00pm

#### **4 - Advances and applications of computational methods in aerospace, Part IV**

Room: 2-131

#### *Session 5: Dynamics*

Chairperson: J. Bayandor

#### **Buckling conducting wires and instabilities of electrodynamic space tethers**

G.H.M. van der Heijden and J. Valverde



**Solenoidal invariance of the dynamics for stability calculations**

J.I.H. López, J.R. Meneghini, J.A.P. Aranha and F. Saltara

**Stability and bifurcation analysis of a two-degree-of-freedom system with clearances**

N. Kranjcevic, M. Stegic and N. Vrankovic

**A nonlinear stability analysis of the support structure of a particle detector**

D. Mladenov

**Wednesday 2:00pm**

**54 - Computational multiscale modeling, Part IV**

Room: 2-132

Chairpersons: S.A. Meguid, K.M. Liew, L.S. Ong and T.Y. Ng

**Scale-independent constitutive law for quasi-brittle materials in compression**

G. Ferro

**Parameter identification of Young's modulus based on dynamic response**

H. Komine and M. Kawahara

**Wednesday 2:00pm**

**28 - Advanced analysis – Multiphysics, Part IV**

Room: 2-135

Chairpersons: J.W. Bull, J.-W. Hong and T. Kalman

**Modeling of debris deposition on an extrusion filter medium**

E.W. Jenkins, C.L. Cox and P.J. Mucha

**Thermo-transient and thermo-mechanical finite element modeling of a diesel four stroke engine piston for variable engine speed conditions**

E.M.R. Bueno, M.L. Bucalem and C.B. Zabeu

**A new approach for analysis of hydro thermomechanical problems**

H. Gholibeigian and A. AmirShakarami

**Wednesday 2:00pm**

**91 - Discretization methods with finite volumes, discontinuous Galerkin methods and the application in porous media, Part IIa**

Room: 2-136

Chairperson: J. Geiser

**Towards a parallel anisotropic Cartesian grid adaptation framework for steam injection processes**

J. Nilsson, M. Gerritsen and R. Younis

**Impact of wind breaks & trees on wind environment around buildings utilizing computational fluid dynamics analysis**

N. Al-Khalidy and C. Pregalato

**Adaptive numerical methods for convection-dominated fluid transport equations based on piecewise linear polynomials**

J. Liu and R.E. Ewing

**Discretisation methods for nonlinear elliptic optimal control problems**

J. Geiser and I. Chrysosoverghi

**Wednesday 2:00pm**

**70 - Computational stochastic mechanics, Part IV**

Room: 2-139

Chairpersons: G.I. Schuëller and S.K. Sachdeva

**Dynamic analysis of stochastic structures using random factor method**

W. Gao

**WEDNESDAY**

## WEDNESDAY

### **Stochastic modeling of bacterial attachment-detachment**

A. Massoudieh, K.E. Nelson and T.R. Ginn

### **Continuum mechanics and finite elements in stationary stochastic fields: the formulation**

C.F. Li, Y.T. Feng and D.R.J. Owen

### **Continuum mechanics and finite elements in stationary stochastic fields: Computational issues**

Y.T. Feng, C.F. Li and D.R.J. Owen

**Wednesday 2:00pm**

### **26 - Advanced analysis – Solids, Part IIa**

Room: 2-143

Chairpersons: C. Gantes, M.L. Bucalem and M. Kaminski

### **On the modeling of the Mannesmann piercing process**

D.A. Berazategui, M.A. Cavaliere, L. Montelatici and E.N. Dvorkin  
(Keynote)

### **Numerical investigation of the deformation of a ground station antenna (ESA)**

T. Bornkessel and M. Schäfer

### **Modeling and macroscopic examinations of TiN ceramic thin layers deposited on polymer elements**

R. Major and P. Lacki

### **Containment scale model post-test analysis**

P. Varpasuo

**Wednesday 2:00pm**

### **212 - Meshing and mesh adaptation, Part IIa**

Room: 2-146

Chairpersons: C. Hüttig and S.K. Khattri

### **ALE technique with the spectral element methods: mesh deformation**

N. Bodard and M.O. Deville

### **3D spherical gridding based on equidistant, constant volume cells for FV/FD methods**

C. Hüttig

### **The advantages of polyhedral meshing for CFD**

S. Ferguson

### **Enhancing mesh-distortion tolerance of isoparametric elements**

S. Rajendran and E.T. Ooi

**Wednesday 2:00pm**

### **104 - Uncertainty in civil engineering and computational mechanics, Part IIa**

Room: 2-147

Chairpersons: B. Möller and S. Chen

### **Fuzzy arithmetical modeling and simulation of structures with uncertain properties**

K. Willner

### **Design of structures – solving the inverse problem**

M. Liebscher and B. Möller

### **Fuzzy multi body systems and fuzzy probabilistic multi body systems and their application for numerical simulation of controlled demolitions of structures**

B. Möller and M. Liebscher

### ***In situ* determination of the residual load-bearing capacity of bridges using fuzzy set theory**

N. Gebbeken and A. Baumhauer

**Wednesday 2:00pm**

**67 - Modeling and solutions for ductile fracture, Part IIa**

Room: 2-151

Chairperson: T. Wierzbicki

**A Cohesive Zone Model for ductile crack propagation in thin-walled structures**

P.D. Zavattieri

**A brittle failure model for tungsten long rod penetrators**

S. Hiermaier, P. Weidemaier and I. Rohr

**The calibration of the three-dimensional damage percolation model**

O.S. Orlov, S.L. Winkler, M.J. Worswick, D.J. Lloyd and M.J. Finn

**The displacement discontinuity method for modeling fracture in the semi-circular bending test**

B. Birgisson, A. Montepara, R. Roque, E. Romeo and G. Tebaldi

**Wednesday 2:00pm**

**9 - Numerical methods for fluid-structure interaction systems, Part Ia**

Room: 4-270

Chairperson: L. Gastaldi

**GSMAC-FEM analysis of largely-deformed fluid-structure interface**

G. Hashimoto and T. Tanahashi

**Loosely- versus strongly-coupled staggered solution procedures for aeroelastic problems**

P. Geuzaine and F. Thirifay

**Liquid motion assessment for partially filled horizontal cylindrical tanks with flat and non-flat heads**

L. Dai and L. Xu

**Wednesday 2:00pm**

**101 - Computational plasticity, Part IVa**

Room: 4-370

Chairpersons: R.I. Borja and C. Foster

**Constitutive modeling of anisotropy and microstructural evolution during superplastic deformation**

F.K. Abu-Farha

**An efficient numerical modelling of anisotropic structural behaviour in large strain plasticity**

I. Karšaj, C. Sansour and J. Sorić

**A new Arbitrary Reference Configuration (ARC) formulation for computational finite strain transient applications**

X. Zhou, K.K. Tamma and D. Sha

**An influence of the material discontinuity on the die forging process -- numerical simulation**

J. Adamus and P. Lacki

**Wednesday 2:00pm**

**20 - Nonlinear dynamics and computational fluid-structure interactions, Part IVa**

*(in honor of Prof. M. P. Paidoussis)*

Room: 10-250

Chairpersons: C. Dalton, A.H. Nayfeh and A.S. Tijsseling

**An overview of vortex shedding and acoustic resonance in heat exchanger tube arrays**

D.S. Weaver

(Keynote)

## WEDNESDAY

### **A numerical investigation of the near wake structure in the varying frequency forced oscillation of a circular cylinder**

S. Atluri and C. Dalton

### **Global stability of empty and fluid-filled imperfect cylindrical shells**

P.B. Gonçalves, Z.J.G.N. Prado and F.M.A. Silva

### **Computational and experimental study of active vibration control of a rectangular plate coupled to liquid**

S. Carra, M. Amabili, R. Ohayon and P.M. Hutin

**Wednesday 2:00pm**

### **222 - Computational fluid dynamics I, Part IVa**

Room: 32-123

Chairpersons : S. Ossia, D. Tang and G.J. Sheard

### **Modelling of flow in gas turbine pre-swirl systems**

A.C. Benim

### **Simulation of advective-diffusive problems by using a hyperbolic model**

H. Gómez, I. Colominas, F. Navarrina and M. Casteleiro

### **(Not) lost in translation: PLM enabled CFD**

S. Ferguson

### **Modeling moving boundary hydrodynamic problems of shallow water flow over complex topography**

D. Farshi and S. Komaei

**Wednesday 2:00pm**

### **200 - Computational fluid dynamics II, Part IVa**

Room: 32-124

Chairperson: J. Iannelli and J.-M. Vaassen

### **A multi-dimensional acoustics-convection upstream resolution Euler solver**

J. Iannelli

(Keynote)

### **The use of real-valued evolutionary algorithms as a tool to combat divergence in non-Newtonian fluids flow simulations**

D.A. Kaminski and R.I. Bourisli

### **Simulation of free-surface flows using moving-grid techniques with spectral element methods**

R. Bouffanais and M.O. Deville

**Wednesday 2:00pm**

### **40 - Computational fluid and solid geodynamics: Methods and challenges, Part IV**

Room: 5-234

Chairperson: G. Glatzmaier

### **Numerical simulations of low Prandtl number rotating magnetoconvection in cylindrical and spherical geometries using a finite volume multigrid method**

P.J. Tackley

### **A finite-volume scheme for thermal convection and dynamo problems in spherical shells**

U. Hansen, H. Harder and K. Stemmer

### **Yin-Yang grid and geodynamo simulation**

A. Kageyama

**4:00 - 4:30pm**

Coffee Break

**Wednesday 4:30pm**

**47 – Advances in the analysis of shells, Part IVb**

Room: 1-190

Chairpersons: W. Wagner, W.B. Krätzig and S. Klinkel

**Numerical procedure of simultaneously determining of the hydraulic properties of porous media**

A.G. Fatullayev

**Analysis of characteristic equations by generalized Newton's method**

I.M. Landman

**Micropolar Theory of Elastic Thin Plates**

S.H. Sargsyan

**Wednesday 4:30pm**

**48 - Vortex dominated flows - Computational, analytical and experimental studies of viscous or inviscid vortical flows and applications, Part IIb**

Room: 1-371

Chairpersons: E. Krause, L. Ting and D. Blackmore

**Perturbed three point vortex dynamics**

D. Blackmore, O. Knio and L. Ting

**Topology change of vortices using stochastic differential equations**

N.K.-R. Kevlahan

**Vortex dipole coordinates on the sphere**

P.K. Newton and H. Shokraneh

**Wednesday 4:30pm**

**25 - Error control and mesh adaptation in FEA, Part IVb**

Room: 1-375

Chairpersons: T. Grätsch and F. Cirak

**An MWLS based Zienkiewicz-Zhu *a posteriori* error estimation without Superconvergent Theory**

J. Krok

**On efficiency of a posteriori error estimates for the Stokes problem**

E. Gorshkova, P. Neittaanmäki and S. Repin

**Wednesday 4:30pm**

**15 - Discontinuous Galerkin methods for PDEs, Part IVb**

Room: 2-105

Chairperson: J.K. Ryan

**Dynamic load balancing for heterogeneous and hierarchical computing environments**

J.D. Teresco, J. Faik, J.E. Flaherty and L.G. Gervasio

**A discontinuous Galerkin spectral/hp method for high order Boussinesq equations**

A. Engsig-Karup, H. Bingham, J. Hesthaven and P. Madsen

**P-adaptivity used as a time step optimizer**

N. Chevaugeon, J.-F. Remacle and E. Marchandise

**Wednesday 4:30pm**

**91 - Discretization methods with finite volumes, discontinuous Galerkin methods and the application in porous media, Part IIb**

Room: 2-136

Chairperson: J. Geiser

**A new stable discontinuous Galerkin approximation for non-linear conservation laws on adaptively refined grids**

A. Dedner, C. Makridakis and M. Ohlberger

**WEDNESDAY**

## WEDNESDAY

### Wednesday 4:30pm

#### **26 - Advanced analysis – Solids, Part IIb**

Room: 2-143

Chairpersons: C. Gantes, M.L. Bucalem and M. Kaminski

#### **A numerical model for predicting the dynamic behavior of an iced cable subjected to mechanical shocks**

T. Kalman, G. McClure, M. Farzaneh and L.E. Kollar

#### **Vibration analysis and drop test of hearing aid**

S. Sundermurthy, D. Tourtelotte and T. Burns

#### **Development of a general three-dimensional L-section beam finite element for elastoplastic large deformation analysis and its application to the analysis of a transmission tower**

P.-S. Lee, X.H. Zhang and G. McClure

#### **Stresses near doors and windows of the Boeing 777 aircraft**

V.G. Ukadgaonker

### Wednesday 4:30pm

#### **212 - Meshing and mesh adaptation, Part IIb**

Room: 2-146

Chairpersons: C. Hüttig and M.M.I. Baig

#### **A variationally consistent mesh adaptive explicit method for Lagrangian dynamics in solid mechanics**

S.K. Lahiri, J. Bonet and J. Peraire

#### **Unstructured mesh generation for wind flow simulation**

K. Nojima and M. Kawahara

### Wednesday 4:30pm

#### **104 - Uncertainty in civil engineering and computational mechanics, Part IIb**

Room: 2-147

Chairpersons: B. Möller and S. Chen

#### **Simulation of fuzzy random variables**

M. Beer

#### **Neural networks in process simulation**

M. Beer and P.D. Spanos

#### **Sensitivity analysis with Green's functions**

O. Carl and F. Hartmann

### Wednesday 4:30pm

#### **67 - Modeling and solutions for ductile fracture, Part IIb**

Room: 2-151

Chairperson: T. Wierzbicki

#### **Numerical simulation of the polyurethane foam expansion during moulding at microscopic and macroscopic scales**

J. Bikard, J. Bruchon, L. Silva and T. Coupez

#### **Experimental and numerical studies of springback in air V-bending process for cold rolled TRIP steels**

D. Fei and P. Hodgson

#### **Metal forming of a tractor idler wheel**

Y.K.K. Liao

### Wednesday 4:30pm

#### **9 - Numerical methods for fluid-structure interaction systems, Part Ib**

Room: 4-270

Chairperson: D. Boffi

**A 3-dimensional fluid-solid interaction model of the left ventricle**

D. Deserranno, M. Kassemi and J. Thomas

**An algorithm for modeling the interaction of a flexible rod with a two dimensional highspeed flow**

D.S.-W. Tam and R. Radovitzky

**An efficient numerical approach for modeling acoustic emission using higher-order elements -- An application to a unidirectional fiber-**

reinforced composite sample

R.-R. Naber and H. Bahai

**Wednesday 4:30pm**

**101 - Computational plasticity, Part IVb**

Room: 4-370

Chairpersons: Chairpersons: R.I. Borja and C. Foster

**Large strain anisotropic plasticity including effects of plastic spin**

F.J. Montans and K.J. Bathe

(Keynote)

**Analytical approximations for solving the plane stress problem in finite hyper-elasticity and finite elasto-plasticity**

T. Wenzel

**Numerical modeling of penetration into compressible rigid-viscoplastic media**

O. Cazacu, I.R. Ionescu and T. Perrot

**Modeling of strain rate history effects in BCC metals**

S. Simunovic and P.V.K.K. Nukala

**Wednesday 4:30pm**

**20 - Nonlinear dynamics and computational fluid-structure interactions, Part IVb**

*(in honor of Prof. M. P. Paidoussis)*

Room: 10-250

Chairpersons: C.E.S. Cesnik and S. Kaneko

**On the compliance of thick-walled elastic tubes**

A. Marzo, X.Y. Luo and C.D. Bertram

**Analysis of the pulse wave velocity of human artery and its application to the blood pressure meter**

S. Kaneko, T. Nakamura, Y. Chang and T. Watanabe

**Simulation of a nonhomogeneous flexible filament moving in a flowing viscous fluid by the immersed boundary method**

L. Zhu

**Immersed Finite Element Method and its applications**

L. Zhang

**Wednesday 4:30pm**

**222 - Computational fluid dynamics I, Part IVb**

Room: 32-123

Chairpersons : S. Ossia, D. Tang and G.J. Sheard

**Numerical investigation of periodically-driven flows**

C. Olah and Y. Bourgault

**Wednesday 4:30pm**

**200 - Computational fluid dynamics II, Part IVb**

Room: 32-124

Chairperson: J. Iannelli and H. Kohno

**Energy transfer in internal waves generated by tidal flow over topography**

A. Korobov and K. Lamb

**WEDNESDAY**

## THURSDAY

### Thursday 9:00am

#### Plenary Lectures

Chairperson: J.W. Tedesco

**9:00 - 10:30am**

**Room:** Kresge Auditorium (W16)

#### **Simulations of particle-fluid suspensions with the Lattice-Boltzmann equation**

A.J.C. Ladd, University of Florida

#### **Applications of computational fluid mechanics at Sandia National Laboratories**

T.C. Bickel and H.C. Morgan, Sandia National Laboratories

**10:30 - 11:00am**

Coffee Break

### Thursday 11:00am

#### **79 - Finite/discrete element methods and applications, Part I**

Room: 1-135

Chairpersons: D.R.J. Owen, J.R. Williams and G. Mustoe

#### **A .NET grid computing system applied to Lattice-Boltzmann**

X. Lin and J.R. Williams

#### **Contact detection between axially-asymmetric ellipsoids in discrete element modeling**

S.M. Johnson, J.R. Williams and B.K. Cook

#### **Modelling of impact using adaptive discrete element techniques**

M.G. Cottrell and D.R.J. Owen

### Thursday 11:00am

#### **63 - Lattice Boltzmann methods for computational fluid dynamics, Part I**

Room: 1-190

Chairpersons: S. Ubertini and S. Succi

#### **Lattice Boltzmann method for computational fluid dynamics**

S. Succi

(Keynote)

#### **Applications of the mean-field Lattice Boltzmann method for solid-fluid interfaces to study interfacial phenomena**

J. Zhang and D.Y. Kwok

#### **A Lattice Boltzmann study on trade-off between mixing and flow efficiency for electromagnetic flow in heterogeneous microchannels with nonuniform surface potentials**

F. Tian and D.Y. Kwok

### Thursday 11:00am

#### **57 - Computational modeling of reacting flow, Part I**

Room: 1-246

Chairperson: H.N. Najm

#### **Nitrogen chemistry controlling steps in methane-air premixed flames**

D.A. Goussis and G. Skevis

(Keynote)

#### **Chemical kinetics mechanism simplification via CSP**

M. Valorani, F. Creta, D.A. Goussis, H.N. Najm and J.C. Lee

#### **On chain branching and its role in homogeneous ignition and premixed flame propagation**

J.C. Lee, H.N. Najm, J. Ray, M. Frenklach, M. Valorani and D.A. Goussis



**Thursday 11:00am**

**90 - Neural networks and soft methods in computational mechanics, Part I**

Room: 1-273

Chairpersons: L. Ziemianski and B.H.V. Topping

**Coupled evolutionary algorithm and artificial neural network in defects identification**

T. Burczynski and A. Skrobol

(Keynote)

**Neural prediction of response spectra from mining tremors using recurrent layered frameworks and Kalman filtering**

A. Krok and Z. Waszczyszyn

**Intelligent finite element method**

A.A. Javadi, T.P. Tan and A.S.I. Elkassas

**Thursday 11:00am**

**209 - Fracture analysis and crack propagation, Part I**

Room: 1-371

Chairperson: D. Pantuso

**Numerical simulation of dynamical fracture in heterogeneous materials**

F. Perales, Y. Monerie, F. Dubois and L. Stainier

**Constraint effects in shallow surface crack analysis in a elbow by a three-term asymptotic approach**

F. Labbe and J.R. Donoso

**Application of fracture mechanics to the study of wear processes**

N. Repčić

**Thursday 11:00am**

**15 - Discontinuous Galerkin methods for PDEs, Part V**

Room: 1-375 (note different room number)

Chairperson: B. Riviere

**The local discontinuous Galerkin method and component design integration for 3D elasticity**

S. Siddarth, J. Carrero, B. Cockburn, K.K. Tamma and R. Kanapady

**On the simulation of two-phase flows with a quadrature-free discontinuous Galerkin method for the level set equation**

E. Marchandise, J.-F. Remacle and N. Chevaugeon

**A hybrid Galerkin atmospheric model**

S.J. Thomas, A. St.-Cyr and R.D. Nair

**Thursday 11:00am**

**61 - Optimization of expensive black-box cost functions, Part I**

Room: 1-379

Chairpersons: M. Meyer and M. Krosche

**A modular approach for simulation-based optimization of technical systems**

P. Schneider, A. Schneider and P. Schwartz

**Condor, a parallel, direct, constrained optimizer for high-computing-load, black-box objective functions**

F. Vanden Berghen

**Evaluation of optimization algorithms for crash and NVH problems**

F. Duddeck and K. Volz

**Thursday 11:00am**

**THURSDAY**

## THURSDAY

### **204 - Turbulence modeling, Part I**

Room: 1-242

Chairperson: A.C. Benim

#### **Large-eddy simulation of turbulent gas-particle flows in the duct induced by the wall injection**

K.N. Volkov

#### **A two-grid finite volume method for variational multiscale large eddy simulation of turbulent flows**

V. Gravemeier

#### **T-RANS based analysis of turbulent swirling flows**

A.C. Benim, A. Nahavandi and K.J. Syed

Thursday 11:00am

### **13 - Modeling of the cardiovascular system, Part I**

Room: 2-105

Chairpersons: D. Chapelle, J.-F. Gerbeau and Y. Bourgault

#### **Fiber architecture of the heart, and its role in cardiac mechanics and electrophysiology**

C.S. Peskin

(Keynote)

#### **Confronting a mathematically derived constitutive law for the myocardium with experimental data**

D. Caillerie, A. Mourad and A. Raoult

#### **Data assimilation for cardiac electromechanical modeling**

P. Moireau and D. Chapelle

Thursday 11:00am

### **27 - Advances in algorithms and applications for incompressible and low-Mach number flows, Part I**

Room: 2-131

Chairpersons: M.A. Christon, D.K. Gartling and M.J. Martinez

#### **GLS-type finite element methods for viscoelastic fluid flow simulation**

M. Behr, D. Arora, O. Coronado-Matutti and M. Pasquali

(Keynote)

#### **A modified conservation law approach to improved finite element Navier-Stokes algorithm**

S. Sahu and A.J. Baker

#### **Recent developments in spectral element simulations of convection-dominated flows**

P.F. Fischer

Thursday 11:00am

### **38 - Nonlinear dynamics - spanning the scales: Algorithms and applications, Part I**

Room: 2-132

Chairpersons: A. Ibrahimbegovic and N. Saha

#### **Nonlinear dynamics of structures and multibody systems**

A. Ibrahimbegovic

(Keynote)

#### **Transfer operator based on diffuse interpolation and energy conservation for damage materials**

D. Brancherie, P. Villon, A. Ibrahimbegovic, A. Rassineux and P. Breitkopf

#### **Time-space field transfer for impact dynamics**

G. Hervé, A. Ibrahimbegovic and P. Villon

**Thursday 11:00am**

**226 - Analysis for earthquake resistant design, Part I**

Room: 2-135

Chairperson: P. Komodromos and D.G. Lignos

**Modal pushover analysis as a tool for evaluation and design of irregular frames**

D.G. Lignos and G.J. Gantes

**Sliding mode control for civil structures based on complex Fourier coefficients of the earthquake**

N.G. Pnevmatikos and C.J. Gantes

**Thursday 11:00am**

**66 - Multi-scale modeling of material behavior – Solids, Part I**

Room: 2-136

Chairpersons: R. Radovitzky and A. Cuitino

**Multiscale modeling of materials: application to mechanochemistry of metals**

E. Kaxiras

(Keynote)

**A multiscale modeling approach to fatigue damage in discontinuous fibre polymer composites**

B.N. Nguyen, B.J. Tucker and M.A. Khaleel

**Novel strategies for the transition from discrete to continuous modelling of materials**

J.F. Ganghoffer, B. Ben Boubaker, B. Haussy, and M. Magno

**Thursday 11:00am**

**215 - Formulations in elasticity, Part I**

Room: 2-139

Chairperson: P.-S. Lee and S.K. Khattri

**On adaptive finite volume methods for elliptic problems with discontinuous coefficients**

S.K. Khattri

**Numerical simulation of the dynamics of a nonlocal inhomogeneous infinite bar**

O. Weckner and E. Emmrich

**An elastic-damage nonlocal interface model**

G. Borino, B. Failla and F. Parrinello

**Thursday 11:00am**

**17 - Boundary element methods and applications, Part I**

Room: 2-142

Chairpersons: F. Dudgeck and O. Steinbach

**Periodic conduction problems: the fast multipole method and convergence of integral equations and lattice sums**

G.J. Rodin and J.R. Overfelt

(Keynote)

**Application of fast multipole methods to the analysis of MEMS**

A. Frangi, A. di Gioia and G. Novati

**Developments of multi-level boundary element methods for steady heat diffusion problems**

M.M. Grigoriev and G.F. Dargush

**Thursday 11:00am**

**26 - Advanced analysis – Solids, Part III**

Room: 2-143

Chairpersons: C. Gantes, M.L. Bucalem and M. Kaminski

**THURSDAY**

## THURSDAY

### **Modeling of the overhead power line post spring-damper using ADINA**

A.B. Peabody and G. McClure

### **A comprehensive methodology for the modeling of diesel four stroke engine pistons for variable engine speed conditions**

E.M.R. Bueno and M.L. Bucalem

### **Flexibility analysis of smooth orthotropic pipe bend**

K.M. Gupta and S.J. Pawar

**Thursday 11:00am**

### **37 - Computational modeling of ionized gas flows, Part I**

Room: 2-146

Chairpersons: S. Roy and D. Gaitonde

### **Numerical studies of laser-induced energy deposition for supersonic flow control**

R. Kandala and G.V. Candler

### **The hypersonic quasineutral gas discharge plasma in magnetic field**

S.T. Surzhikov and J.S. Shang

### **Scaling laws for the high-pressure inductively coupled plasma torch under thermochemical non-equilibrium**

D. Vanden-Abeelee and G. Degrez

**Thursday 11:00am**

### **104 - Uncertainty in civil engineering and computational mechanics, Part III**

Room: 2-147

Chairperson: P.M. Mariano

### **Dynamic coupling between phonon and phason modes in quasiperiodic alloys**

M. Gei and P.M. Mariano

(Keynote)

### **Addressing variability and uncertainty to improve product design**

G. Allen

### **Medium frequency computations of structures including interface uncertainties**

C. Blanzé and P. Rouch

**Thursday 11:00am**

### **211 – Methods and modeling for analysis of concrete and related structures, Part I**

Room: 2-151

Chairperson: P. Grassl

### **Plasticity with nonlocal damage, with application to concrete cracking**

P. Grassl and M. Jirasek

### **“Transient thermal creep” of concrete: intrinsic behaviour or structural effect?**

G. Mounajed, H. Boussa, F. Grondin and A. Menou

### **Finite element stress analysis of reinforced high-strength concrete columns in severe fires**

J.H. Chung, G.R. Consolazio and M.C. McVay

**Thursday 11:00am**

### **9 - Numerical methods for fluid-structure interaction systems, Part II**

Room: 4-270

Chairperson: L. Gastaldi

**An algorithm for distributed immersed boundary computations**  
E. Givberg

**Shell-fluid coupled simulation of detonation-driven fracture and fragmentation**  
F. Cirak and R. Deiterding

**Fluid-structure-soil interaction in time domain**  
S. Küçükarslan

**Thursday 11:00am**

**101 - Computational plasticity, Part V**  
Room: 4-370  
Chairpersons: F.J. Montans and R.I. Borja

**Finite element analysis coupled with strain gradient plasticity**  
J.-W. Hong, B. Birgisson and J.W. Tedesco  
(Keynote)

**Elastoplastic damage analysis of n-phase hybrid composites**  
E.T.Y. Ng and A. Suleman

**Numerical analysis of a quasistatic viscoplastic contact problem with friction and damage**  
M. Campo, J.R., Fernandez and T.-V. Hoarau-Mantel

**Thursday 11:00am**

**20 - Nonlinear dynamics and computational fluid-structure interactions, Part V**  
*(in honor of Prof. M. P. Paidoussis)*  
Room: 10-250  
Chairpersons: H. Matthies and R. Ohayon

**Structural-acoustic vibration and transient problems with interface damping: Symmetric variational formulation and finite element results**  
J.-F. Deü, W. Larbi and R. Ohayon  
(Keynote)

**A coupled meshfree/meshbased method for complex fluid-structure interaction problems**  
T.-P. Fries and H.G. Matthies

**An immersed interface method for the incompressible Navier-Stokes equations in irregular domains**  
D.V. Le, B.C. Khoo and J. Peraire

**Thursday 11:00am**

**222 - Computational fluid dynamics I, Part V**  
Room: 32-123  
Chairpersons : S. Ossia, D. Tang and G.J. Sheard

**Particle tracking: From raindrops in 1940 to drug dissolution in 2005**  
N.M. McMahon, M. Crane, H.J. Ruskin and L.J. Crane

**Assessment of hydrodynamic performance of microfluidic peristaltic pumps**  
C.Y. Park, C.F. Dewey Jr.

**Numerical simulation of two-dimensional ceramic candle filter flow**  
M.H. Al-Hajeri

**Thursday 11:00am**

**200 - Computational fluid dynamics II, Part V**  
Room: 32-124  
Chairperson: J. Iannelli and J.-M. Vaassen

**THURSDAY**

## THURSDAY

**Finite element method for CFD based on Helmholtz-decomposition**  
J. Imamura and T. Tanahashi

**Thursday 11:00am**

**19 - Multiscale, multiphysics computational fluid dynamics, Part I**  
Room: 5-234  
Chairpersons: Y. Zhang and J. Glimm

**Numerical study of the breakup of a fluid thread surrounded by a more viscous fluid**  
M. Siegel

**Tracked flame simulation for Type Ia supernova**  
Y. Zhang, J. Glimm and S. Dutta

**The jet simulation in a diesel engine**  
J. Glimm, M.N. Kim, X.-L. Li, R. Samulyak and Z.-L. Xu

**12:30 -2:00pm**  
Lunch Break

**Thursday 2:00pm**

**79 - Finite/discrete element methods and applications, Part IIa**  
Room: 1-135  
Chairpersons: D.R.J. Owen, J.R. Williams and G. Mustoe

**Simulation of an Extensive Underground Structure Subjected to Dynamic Loading Using the Distinct Element Method**  
J.P. Morris and M.P. Bonner

**An energy based polyhedron to polyhedron contact model**  
Y.T. Feng, K. Han and D.R.J. Owen

**Towards one billion particle systems**  
A. Munjiza, E. Rougier and N.W.M. John

**Virtual experimentation in the service of theoretical and experimental science**  
A. Munjiza, E. Rougier and N.W.M. John

**Thursday 2:00pm**

**63 - Lattice Boltzmann methods for computational fluid dynamics, Part IIa**  
Room: 1-190  
Chairpersons: S. Ubertini and S. Succi

**Image-based computational hemodynamics with the Lattice Boltzmann method**  
A.G. Hoekstra

**Extension of the LBM to 3D fully unstructured grids**  
S. Ubertini, N. Rossi, G. Bella and S. Succi

**General theory of Galilean-invariant entropic Lattice Boltzmann models**  
B.M. Boghosian

**Efficient immiscible multiphase flow simulations on hierarchical grids based on the Lattice-Boltzmann method**  
S. Freudiger, J. Toelke and M. Krafczyk

**Thursday 2:00pm**

**57 - Computational modeling of reacting flow, Part IIa**  
Room: 1-246

Chairperson: H.N. Najm

**Uncertainty quantification in reacting flow computations**

H.N. Najm  
(Keynote)

**A quasi-one-dimensional unsteady laminar flame formulation with independent strain rate and curvature**

R.L. Speth, Y.M. Marzouk and A.F. Ghoniem

**Consistent hybrid LES-FDF simulation of turbulent reactive flows**

V. Raman and H. Pitsch

**Rigorous error control in reacting flow simulations using reduced chemistry models**

O. Oluwole and W.H. Green

**Thursday 2:00pm**

**90 - Neural networks and soft methods in computational mechanics, Part IIa**

Room: 1-273

Chairpersons: L. Ziemianski and B.H.V. Topping

**Genetic algorithm transformations for non-orthogonal models**

R. Obiała, G.M. Seed, B.H.V. Topping, P. Iványi and D.E.R. Clark  
(Keynote)

**Identification of stiffness reductions in beams using parameter-dependent frequency changes and neural networks**

A. Borowiec and L. Ziemianski

**Wing shape optimization by using the dynamic mesh and genetic algorithm**

E. Vatandaş and I. Özkol

**Augmenting genetic algorithm with neural network and implementation to the airfoil design**

A. Hacıoğlu

**Thursday 2:00pm**

**209 - Fracture analysis and crack propagation, Part IIa**

Room: 1-371

Chairperson: D. Pantuso

**Numerical evaluation of combined branching and closure effects on fatigue crack growth**

M.A. Meggiolaro, A.C.O. Miranda, J.T.P. Castro and L.F. Martha

**Lower bound to Low Cycle Fatigue life time and its application to safe design of elastic viscoplastic structures**

B. Druyanov and I. Roman

**Tri-dimensional finite element modelling of fatigue crack closure**

A. González-Herrera and J. Zapatero

**Thursday 2:00pm**

**34 - Molecular methods in mechanics**

Room: 1-379

Chairperson: N.G. Hadjiconstantinou and H. Al-Mohssen

**A variance reduction technique for Monte Carlo solutions of the non-linear Boltzmann equation**

L.L. Baker and N.G. Hadjiconstantinou  
(Keynote)

**An atomistic study of ductile fracture in a single crystal**

S. Xu and X. Deng

**THURSDAY**

## THURSDAY

### **Molecular dynamics approach for investigation of grain boundary response with applications to continuum simulation of failure in nano-crystalline materials**

B. Ganapathysubramanian, V. Sundararaghavan and N. Zabaras

### **Uniaxial tensile test on an amorphous solid with embedded quasi-crystallites: A molecular dynamics study**

Y.F. Shi and M.L. Falk

**Thursday 2:00pm**

### **61 - Optimization of expensive black-box cost functions, Part IIa**

Room: 1-379

Chairpersons: M. Meyer and M. Krosche

### **Towards automated optimization**

A. Junghanns, D. Petzoldt, J. Dageförde and M. Meyer

### **An abstract interface for surrogate optimization in the PLATON framework**

A.K.M. Fahimuddin, M. Krosche and G. Matthies

### **Strategies for efficiency in inverse modelling of material parameters for predictive modelling of aerospace alloys**

B. Elliott and N. Petrinic

### **Managing models for simulation-based design optimization, Part I**

N.M. Alexandrov and R.M. Lewis

**Thursday 2:00pm**

### **204 - Turbulence modeling, Part II**

Room: 1-242

Chairperson: A.C. Benim

### **Large-eddy simulations of fluid structure interaction problems**

J. Yang, S. Preidikman and E. Balaras

### **A definition for Large Eddy Simulation approximations of the Navier-Stokes equations**

J.-L. Guermond and S. Prudhomme

### **Improving RANS solvers for LES on unstructured meshes: Application to the flow past a sphere**

L. Georges, E. Marchandise and P. Geuzaine

### **Large eddy simulation of wall bounded flows by the variational multiscale finite element method**

C.E. Colosqui and A.A. Oberai

**Thursday 2:00pm**

### **13 - Modeling of the cardiovascular system, Part IIa**

Room: 2-105

Chairpersons: D. Chapelle, J.-F. Gerbeau and Y. Bourgault

### **Comparison of numerical schemes for the bidomain model**

Y. Bourgault and M. Ethier

### **A finite volume method for the coupled heart-torso bidomain model in electro-cardiology**

Y. Coudière, C. Pierre and R. Turpault

### **Weak and strong coupling in Fluid-Structure Interaction in blood flows**

J.-F. Gerbeau

### **RANS computations of artery flows**

G. Medic

**Thursday 2:00pm**



**27 - Advances in algorithms and applications for incompressible and low-Mach number flows, Part IIa**

Room: 2-131

Chairpersons: M.A. Christon, D.K. Gartling and M.J. Martinez

**Mach-uniformity through the coupled pressure and temperature correction algorithm**

K. Nerinckx, J. Vierendeels and E. Dick

**A dynamically adaptive wavelet method applied to incompressible flows**

D. Wirasaet and S. Paolucci

**The local variational multiscale method**

S.S. Collis and S. Ramakrishnan

**Approximate projection methods and time integration stability**

C.D. Moen, S.P. Domino and G.J. Wagner

**Thursday 2:00pm**

**38 - Nonlinear dynamics - spanning the scales: Algorithms and applications, Part IIa**

Room: 2-132

Chairpersons: C.L. Bottasso, D. Brancherie and G. Hervé

**A simple way to improve the sensitivity to perturbations in the numerical solution of high index stiff differential algebraic equations**

C.L. Bottasso and O.A. Bauchau

(Keynote)

**Modeling active muscles behavior for emergency braking situations**

M. Behr, P.J. Arnoux, T. Serre, K. Kayvantash and C. Brunet

**Mass minimization of vehicle structure subject to varying crashworthiness constraints: a prediction-correction approach**

Ch. Wauquiez, K. Kayvantash, S. Masfrand, T. Bekkour and F. Arnaudeau

**Effect of forming on crash performance of automotive structure - an analytical study**

M.O. Faruque, K. Mallela, D. Zeng and N. Saha

**Thursday 2:00pm**

**226 - Analysis for earthquake resistant design, Part II**

Room: 2-135

Chairpersons: D.G. Lignos and P. Komodromos

**Cost-Benefit analysis of conventional and seismic isolated R/C buildings**

E.C. Vassilas and V.K. Koumousis

**Impact effects on the behavior of seismically isolated buildings**

P. Komodromos

**Thursday 2:00pm**

**66 - Multi-scale modeling of material behavior – Solids, Part IIa**

Room: 2-136

Chairpersons: R. Radovitzky and A. Cuitino

**Theoretical and numerical study of the result of an applied load on pores in solids**

V. I. Betechtina, Yu. M. Dahl, A.G. Kadomtsev and S. Yu. Veselkov

**Model Reduction via Parameterized Invariant Manifolds: Some Examples**

A. Sawant and A. Acharya

**THURSDAY**

## THURSDAY

### **Quantum-mechanics-based nonlinear elastic energy densities for martensitic materials over a large range of deformations**

A. Lew

### **Measurement of Nye dislocation density tensor and geometrically necessary dislocation density based upon lattice rotation measurements**

J.W. Kysar and Y.X. Gan

**Thursday 2:00pm**

### **215 - Formulations in elasticity, Part IIa**

Room: 2-139

Chairperson: P.-S. Lee and S.K. Khattri

### **The generalized quasi-variational principles of non-conservative systems of elasto-dynamics**

L. Liang, T. Fan and H. Li

### **Elastic wave propagation on Cartesian grids with embedded boundaries**

S. Nilsson

### **Integral equations and their numerical solution for graded materials elasticity**

V. Minutolo

**Thursday 2:00pm**

### **17 - Boundary element methods and applications, Part IIa**

Room: 2-142

Chairpersons: F. Duddeck and O. Steinbach

### **The Fourier boundary element method and its singularities**

F. Duddeck

(Keynote)

### **An accelerated boundary element method using Fast Fourier Transform on multipoles**

K.-M. Lim, E.-T. Ong and H.-P. Lee

### **Fast Galerkin BEM by a Precorrected-FFT**

S.N. Fata, L.J. Gray and T. Kaplan

### **Boundary element methods for interface cracks with complex stress intensity factors**

A.R. Hadjesfandiari and G.F. Dargush

**Thursday 2:00pm**

### **26 - Advanced analysis – Solids, Part IVa**

Room: 2-143

Chairpersons: C. Gantes, M.L. Bucalem and M. Kaminski

### **Determining stress intensification factor for smooth orthotropic pipe bend**

K.M. Gupta and S.J. Pawar

### **Using collision physics and Cosserat rod theory to model the transient behavior of drilling tool strings**

J. Pabon and D. Pafitis

### **Inelastic lateral-torsional buckling of castellated beams with an elastic lateral restraint**

A. Mohebkhah

**Thursday 2:00pm**

### **37 - Computational modeling of ionized gas flows, Part IIa**

Room: 2-146

Chairpersons: K. Chatterjee and D. Gaitonde

**Nonequilibrium relaxation in high temperature gas flows**

E. Josyula and K. Xu

**Implicit, approximately-factored upwind scheme for glow discharge modeling**

J. Poggie

**Finite element modeling of a two fluid RF plasma discharge**

H. Kumar and S. Roy

**Thursday 2:00pm**

**104 - Uncertainty in civil engineering and computational mechanics, Part IV**

Room: 2-147

Chairperson: P.M. Mariano

**Cavitator design for a supercavitating torpedo using Evidence Theory for reliability estimation**

E. Alyanak, R.V. Grandhi and H-R. Bae

(Keynote)

**A probabilistic approach to improve the static performance of a composite wing**

R. d'Ippolito, S. Donders, N. Tzannetakis, J. Van de Peer and H. Van de Auweraer

**Aeroelastic response of rectangular cylinders: influence of indicial function parameters**

C. Borri and C. Costa

**Stochastic clustering and self-organisation of phonon and phason modes in quasicrystals**

P.M. Mariano, F.L. Stazi, M. Gioffré and G. Augusti

**Thursday 2:00pm**

**211 – Methods and modeling for analysis of concrete and related structures, Part IIa**

Room: 2-151

Chairpersons: B. Birgisson and W. Buttlar

**Numerical simulation of the creep phenomenon of steel fiber reinforced concrete**

S.A. Saif Eldeen and T. Taniguchi

**Nonlinear finite element analysis of post-peak behavior of reinforced concrete considering bond-slip effect**

Y. Wu and A.K.H. Kwan

**Methods of increasing fatigue life and reducing runway deflections following and explosion beneath a cement concrete runway**

J.W. Bull and C.H. Woodford

**Thursday 2:00pm**

**9 - Numerical methods for fluid-structure interaction systems, Part IIIa**

Room: 4-270

Chairperson: D. Boffi

**Finite element methods for moving surfaces and applications**

R.H. Nochetto

(Keynote)

**A semi-implicit projection-based algorithm for fluid-structure interaction problems with strong added-mass effect**

M.A. Fernández, J.-F. Gerbeau and C. Grandmont

**Stability results for the finite element approach to the immersed boundary method**

D. Boffi, L. Gastaldi and L. Heltai

**THURSDAY**

## THURSDAY

### **A posteriori error estimates for an eigenvalue problem arising from fluid-structure interaction**

F. Gardini

**Thursday 2:00pm**

### **101 - Computational plasticity, Part VIa**

Room: 4-370

Chairpersons: F.J. Montans and J.C. Gálvez

### **Length scales evolutions and localization phenomenon in sand**

M.I. Alsaleh, G. Voyiadjis and K.A. Alshibli

(Keynote)

### **Localization analysis for overconsolidated Kaolin clay behavior**

A. Prashant and D. Penumadu

### ***Special Session: Nano-and micromechanics of particulate materials***

Chairperson: S.J. Antony

### **Experimental and computational thermomechanical study of a shape memory alloy micro-actuator: Aspects of antagonist type behavior**

R. Velázquez, M. Hafez, J. Szewczyk and E. Pissaloux

### **A hybrid DEM model suitable for micro and nano particulate systems incorporating long-range force contributions**

F. Sarangi, S.J. Antony and M.R. Kuhn

**Thursday 2:00pm**

### **200 - Computational fluid dynamics II, Part VIa**

Room: 32-124

### ***Special Session: Nonlinear Dynamics of Fluids***

Chairpersons: G. Haller, C.W. Rowley and E. Schuckburgh

### **Microfluidic mixing and particle motion control**

I. Mezic

(Keynote)

### **Quantifying eddy diffusivities in geophysical flows**

E. Shuckburgh

### **Coherent structures and low-order models of transitional and turbulent channel flow**

C.W. Rowley and M. Green

### **The mathematical analysis of mixing of fluids**

F.M. Allan

**Thursday 2:00pm**

### **19 - Multiscale, multiphysics computational fluid dynamics, Part IIa**

Room: 5-234

Chairpersons: Y. Zhang and J. Glimm

### **Particle simulation of vortex sheet roll-up**

R. Krasny

### **Resolution of a foundational multiscale problem in classical energy-entropy theories on a rotating sphere**

C.C. Lim

### **Thermonuclear supernovae: Multiscale and multiphysics in astrophysical fluid dynamics**

T. Plewa

### **Numerical methods for multiscale fluid mechanics**

S. Chen

**4:00 - 4:30pm**

Coffee Break

**Thursday 4:30pm**

**63 - Lattice Boltzmann methods for computational fluid dynamics, Part IIb**

Room: 1-190

Chairpersons: S. Ubertini and S. Succi

**A thermal model based on the Lattice Boltzmann method for low Mach number compressible flows**

J. Toelke and M. Krafczyk

**A coupled approach for the simulation of bidirectional fluid-structure interaction based on the Lattice Boltzmann and the finite element method**

S. Geller, J. Toelke and M. Krafczyk

**Lattice and discrete Boltzmann equations for fully compressible flow**

P.J. Dellar

**Lattice Boltzmann models for hydrodynamics and microflows**

I.V. Karlin

**Thursday 4:30pm**

**57 - Computational modeling of reacting flow, Part IIb**

Room: 1-246

Chairperson: H.N. Najm

**Using ISAT in simulations of unsteady reacting flows**

M.A. Singer, S.B. Pope and H.N. Najm

**Improved Navier-Stokes characteristic boundary conditions for direct simulations of compressible reacting flows**

C.S. Yoo, H.G. Im, Y. Wang and A. Trouvé

**Thursday 4:30pm**

**90 - Neural networks and soft methods in computational mechanics, Part IIb**

Room: 1-273

Chairpersons: L. Ziemianski and B.H.V. Topping

**Thermal optimisation of the squeeze forming process using genetic algorithms**

R. Ahmad, D.T. Gethin, R.W. Lewis, R.S. Lansing and E.W. Postek

**A two stage adaptive genetic algorithm for structural topology optimization**

C.V. Ramakrishnan and R. Balamurugan

**Thursday 4:30pm**

**209 - Fracture analysis and crack propagation, Part IIb**

Room: 1-371

Chairperson: D. Pantuso

**Numerical Simulations of Fracture Propagation in Heterogeneous Geomaterials Based on Digital Image Modeling Method**

S. Chen, Z.Q. Yue and L.G. Tham

**The effects of lattice orientation on a microstructurally short, kinked crack in 316L steel**

I. Simonovski, K.-F. Nilsson and L. Cizelj

**Thin film crack propagation using the enriched displacement method**

B. Voinov and D. Pantuso

**Thursday 4:30pm**

**61 - Optimization of expensive black-box cost functions, Part IIb**

Room: 1-379

Chairpersons: M. Meyer and M. Krosche

**THURSDAY**

## THURSDAY

**Managing models for simulation-based design optimization, Part 2**  
N.M. Alexandrov and R.M. Lewis

**Optimization of discrete event stochastic systems using the PLATON system**  
M. Krosche

**Active control and drag optimization for flow past a cylinder at high Reynolds number using genetic algorithms**  
S.B. Talla, K. Deb and T.K. Sengupta

**Thursday 4:30pm**

**13 - Modeling of the cardiovascular system, Part IIb**  
Room: 2-105  
Chairpersons: D. Chapelle, J.-F. Gerbeau and Y. Bourgault

**Computational study of shocked blood flows within an elastic atherosclerotic aorta**  
J. Iannelli

**Application of vascular CFD for clinical evaluation of cerebral aneurysms**  
M.A. Castro, C.M. Putman and J.R. Cebral

**Numerical simulation of flow alterations after carotid artery stenting from multi-modality image data**  
J.R. Cebral, M.A. Castro and C.M. Putman

**Thursday 4:30pm**

**27 - Advances in algorithms and applications for incompressible and low-Mach number flows, Part IIb**  
Room: 2-131  
Chairpersons: M.A. Christon, D.K. Gartling and M.J. Martinez

**Computational stability study of 3D flow in a differentially heated 8:1:1 cavity**  
A.G. Salinger

**Modeling of coupled conduction and convection under dehumidifying conditions**  
G. Comini, C. Nonino and S. Savino

**FEM simulation of unsteady viscous incompressible fluid flows**  
A. Tralli and P. Gaudenzi

**Thursday 4:30pm**

**38 - Nonlinear dynamics - spanning the scales: Algorithms and applications, Part IIb**  
Room: 2-132  
Chairpersons: C.L. Bottasso, D. Brancherie and G. Hervé

**Folded airbag deployment examples using RADIOSS**  
V. Faucher, F. Arnaudeau and G. Winkelmuller

**Metallic and non-metallic fracture under impact loading and the state of the analytical capabilities**  
N.K. Saha and M.O. Faruque

**Receptivity of a low Reynolds number Bickley jet to harmonic oscillations**  
S.K. Sircar and T.K. Sengupta

**Thursday 4:30pm**

**66 - Multi-scale modeling of material behavior – Solids, Part IIb**  
Room: 2-136  
Chairpersons: R. Radovitzky and A. Cuitino

**Evaluation of material strength in inelastic heterogeneous microstructures: A toolbox for virtual experimentation**

M.E. Thompson, V. Sundararaghavan and N. Zabaras

**Estimating rubber friction from interactions at the asperity level**

Q.V. Bui and J.-P. Ponthot

**A consistent framework for viscoplastic deformations of fcc metals**

F.H. Abed and G.Z. Voyiadjis

**Thursday 4:30pm**

**215 - Formulations in elasticity, Part IIb**

Room: 2-139

Chairperson: P.-S. Lee and S.K. Khattri

**Polyconvex strain energy functions for materials with cubic symmetry**

N. Kambouchev, J. Fernandez and R. Radovitzky

**Determination of Green's tensor for a micropolar elastic medium**

M. Mitra and R.K. Bhattacharyya

**Thursday 4:30pm**

**17 - Boundary element methods and applications, Part IIb**

Room: 2-142

Chairpersons: F. Duddeck and O. Steinbach

**Highly convective flows via boundary element methods: Recent advances and challenges**

G.F. Dargush and M.M. Grigoriev

**Fast BEM methods for the efficient treatment of elliptic shape optimization problems**

K. Eppler

**Thursday 4:30pm**

**26 - Advanced analysis – Solids, Part IVb**

Room: 2-143

Chairpersons: C. Gantes, M.L. Bucalem and M. Kaminski

**Polymeric-composite bandages for damaged steel pipes**

B. Kopey and V. Kopey

**A direct boundary integral method for viscoelastic-elastic composite materials**

Y. Huang, S.L. Crouch and S.G. Mogilevskaya

**A diversity of computer approaches in homogenization of random composites**

M. Kaminski

**Thursday 4:30pm**

**37 - Computational modeling of ionized gas flows, Part IIb**

Room: 2-146

Chairpersons: E. Josyula and J. Poggie

**Flow control simulations of stalled airfoils with electrohydrodynamic body forces**

D.V. Gaitonde, M.R. Visbal and S. Roy

**A two-dimensional floating random-walk algorithm for the solution of the nonlinear Poisson-Boltzmann equation: Application to the modeling of plasma sheaths**

K. Chatterjee and J. Poggie

**Development of a multiscale ionized gas flow code for plasma applications**

S. Roy and D.V. Gaitonde

**THURSDAY**

## THURSDAY

### Thursday 4:30pm

#### **211 – Methods and modeling for analysis of concrete and related structures, Part IIb**

Room: 2-151

Chairpersons: B. Birgisson and W. Buttlar

#### **Smearred crack approach for asphalt concrete**

R. Wu and J. Harvey

#### **A two-dimensional elastic model of pavements with thermal failure**

H.M. Yin, W.G. Buttlar and G.H. Paulino

#### **A virtual testing procedure for the evaluation of cracking performance of hot mix asphalt**

V. Subramanian, Z. Feng, P. Zhang, M. Guddati, and Y.R. Kim

#### **Three-layered hot-mix asphalt mixture**

B. Huang, G. Li and X. Shu

### Thursday 4:30pm

#### **9 - Numerical methods for fluid-structure interaction systems, Part IIIb**

Room: 4-270

Chairperson: L. Gastaldi

#### **From immersed boundary method to immersed continuum method**

X.S. Wang

#### **A three-field computational methodology for fluid-structure interaction**

E. Swim and P. Seshaiyer

#### **Proper orthogonal decomposition in the frequency domain to characterize the dynamics of coupled structural-acoustical systems**

C.I. Papadopoulos and I.T. Georgiou

### Thursday 4:30pm

#### **101 - Computational plasticity, Part VIb**

Room: 4-370

*Special Session: Nano-and micromechanics of particulate materials (continued)*

Chairperson: S.J. Antony

#### **Statistical weighting in simulation of aggregate particle formation and growth**

R.I.A. Patterson and M. Kraft

#### **Tri-axial deformation characteristics of Si-based particulate assemblies: A comparative study using DEM and atomistic simulations**

M. Amin and S.J. Antony

#### **Thermodynamically accurate particle-based mesodynamics**

A. Strachan

### Thursday 4:30pm

#### **200 - Computational fluid dynamics II, Part VIb**

Room: 32-124

*Special Session: Nonlinear Dynamics of Fluids*

Chairpersons: G. Haller, C.W. Rowley and E. Schuckburgh

#### **Large-scale transport and stirring in geophysical flows**

B. Legras and F. d'Ovidio  
(Keynote)

#### **Vortex induced chaotic transport and mixing on a sphere**

P.K. Newton and S.D. Ross

#### **Numerical simulations of air entrainment by a plunging liquid jet**

A.Y. Galimov, K. Jansen, R.T. Lahey Jr., F.J. Moraga



**Thursday 4:30pm**

**19 - Multiscale, multiphysics computational fluid dynamics, Part IIb**

Room: 5-234

Chairpersons: Y. Zhang and J. Glimm

**Level set method for simulating multi-phase multi-component dendritic solidification**

L. Tan and N. Zabaras

**THURSDAY**

## FRIDAY

### Friday 9:00am

#### Plenary Lectures

Chairperson: E.N. Dvorkin

9:00 - 10:30am

Room: Kresge Auditorium (W16)

#### On the treatment of uncertainties in structural mechanics & analysis

G.I. Schuëller, University of Innsbruck

#### Integration of multidisciplinary analysis with Product Lifecycle Management on the Boeing 787

K.R. Fowler, The Boeing Company

10:30 - 11:00am

Coffee Break

### Friday 11:00am

#### 63 - Lattice Boltzmann methods for computational fluid dynamics, Part III

Room: 1-190

Chairpersons: S. Ubertini and S. Succi

#### Displacement of a three-dimensional immiscible droplet in a duct Q. Kang, D. Zhang and S. Chen

#### A rotational invariant Lattice Boltzmann method for high Knudsen number flow simulation

R. Zhang, H. Chen and I. Staroselsky

#### A coarse Newton approach for steady solutions of the Boltzmann equation

H.A. Al-Mohssen, N.G. Hadjiconstantinou and I.G. Kevrekidis

### Friday 11:00am

#### 57 - Computational modeling of reacting flow, Part III

Room: 1-246

Chairperson: H.N. Najm

#### Effects of heat and momentum losses on the flame stability in a narrow channel

S.H. Kang, S.W. Baek and H.G. Im

#### Multi scale numerical simulation of the dispersed reacting flow, using a mathematical model for the chemical vapor deposition of alumina

A.A. Markov

### Friday 11:00am

#### 68 - Computational aspects for the design and the analysis of the Messina Strait Bridge, Part I

Room: 1-277

Chairperson: F. Bontempi

#### Computational aspects for the design and the analysis of the Messina Strait Bridge: Global strategies and problem organization

F. Bontempi

#### Load scenarios and serviceability tests for the Messina Strait Bridge by time-history simulations

F. Giuliano, F. Petrini and K. Gkoumas

#### Analysis of the serviceability performances of a long suspension bridge by genetic algorithm approach

L. Sgambi

### Friday 11:00am

**32 - Pre-conditioned methods, applications and software environment, Part I**

Room: 1-379

Chairperson: G.A. Gravvanis and J. Zhang

**Normalized implicit preconditioned methods based on normalized finite element approximate factorization procedures**

G.A. Gravvanis and K.M. Giannoutakis

(Keynote)

**Parallel normalized implicit preconditioned conjugate gradient methods for solving biharmonic equations on symmetric multiprocessor system**

G.A. Gravvanis and K.M. Giannoutakis

**Performance of ILUT preconditioners in modeling bioheat and mass transfer in skin thermal injury**

W. Shen, J. Zhang and F. Yang

**Friday 11:00am**

**13 - Modeling of the cardiovascular system, Part III**

Room: 2-105

Chairpersons: D. Chapelle, J.-F. Gerbeau and Y. Bourgault

**Real time reduced basis techniques in real life arterial bypass surgery**

G. Rozza

**Estimation of hemolysis in centrifugal blood pumps using morphology tensor approach**

D. Arora, M. Behr, O. Coronada-Matutti and M. Pasquali

**Closed-loop simulation of a ventricular assist device coupled with a circulatory system model**

M.G. Doyle, S. Tavoularis and Y. Bourgault

**Friday 11:00am**

**27 - Advances in algorithms and applications for incompressible and low-Mach number flows, Part III**

Room: 2-131

Chairpersons: M.A. Christon, D.K. Gartling and M.J. Martinez

**Simulating dendritic growth with convection**

J.C. Heinrich, D.R. Poirier and P. Zhao

(Keynote)

**Computing three-dimensional, steady-state, incompressible flows in melt crystal growth systems using a new, higher-order, mixed-formulation, Galerkin finite element method**

Y.-I. Kwon, P. Sonda, A. Yeckel and J.J. Derby

**A balanced-force, volume tracking algorithm for surface tension driven flows**

M.M. Francois, J.M. Sicilian, D.B. Kothe, and S.J. Cummins

**Friday 11:00am**

**66 - Multi-scale modeling of material behavior – Solids, Part III**

Room: 2-136

Chairpersons: R. Radovitzky and A. Cuitino

**Quasicontinuum study of void growth and coalescence in Al**

J. Marian, J. Knap and M. Ortiz

**An explicit formulation for multiscale modeling of bcc metals**

S.N. Kuchnicki, R.A. Radovitzky and A.M. Cuitiño

**A study on heterogeneous deformation behaviors in aluminum oligocrystals**

Z. Zhao, J. Smith and R. Radovitzky

**FRIDAY**

## FRIDAY

### Friday 11:00am

#### **49 - Localized drug delivery, Part I**

Room: 2-139

Chairpersons: A.R. Tzafiri and G. Ledezma

#### **Three dimensional geometries and grids for the numerical simulation of drug diffusion through the stratum corneum**

D. Feuchter

#### **Modeling and numerical simulation of drug diffusion through stratum corneum**

M. Heisig

#### **Analysis of cell-growth and angiogenesis in 3-dimensional scaffolds**

J. Lowengrub

### Friday 11:00am

#### **76 - Multi-physics coupling in material processing, Part I**

Room: 2-146

Chairpersons: F. Bay and J.-L. Chenot

#### **Modelization and numerical approximation of ferromagnetic materials at microscopic scale**

M. Bernadou, S. Depeyre, S. He, and P. Meiland  
(Keynote)

#### **Numerical modeling of electromagnetic couplings in material forming processes**

F. Bay and J.-L. Chenot

#### **Modeling melt crystal growth processes via a self-consistent coupling of multiple scales and physics**

A. Pandey, L. Lun, P. Sonda, A. Yeckel and J.J. Derby

### Friday 11:00am

#### **9 - Numerical methods for fluid-structure interaction systems, Part IV**

Room: 4-270

Chairperson: D. Boffi

#### **Toward a definition of LES**

J.-L. Guermond and S. Prudhomme

#### **On the opening time of a pipe break on a main steam line in a nuclear power station**

J. Sundqvist, B. Olsson and T. Sussman

#### **Thermo-mechanical fluid-structure-interaction for hypersonic applications**

R. Niesner, M. Haupt and P. Horst

### 12:30 - 2:00pm

Lunch Break

### Friday 2:00pm

#### **68 - Computational aspects for the design and the analysis of the Messina Strait Bridge, Part II**

Room: 1-277

Chairperson: F. Bontempi

#### **The design process of complex structural system with regard to the dependability**

F. Bontempi and K. Gkoumas

#### **Seismic action modeling and long suspension bridge response computation**

L. Sgambi

**Computational and structural aspects in the assessment of the aerodynamic behavior of long suspension bridge deck sections**

F. Giuliano and F. Petrini

**Friday 2:00pm**

**32 - Pre-conditioned methods, applications and software environment, Part II**

Room: 1-379

Chairperson: G.A. Gravvanis and U.F. Meissner

**Dynamically distributed and p-adaptive FE-simulation of soil-structure-interaction based on multi-agent-systems**

U.F. Meissner, M. Mueller and J. Ruben

(Keynote)

**Investigation of nozzle stability for the first ovalization mode by numerical solution of the fluid structure interaction problem**

R. Schwane and Y. Xia

**Improving productivity for parallel finite element codes through software engineering**

D.R. Shires and B.J. Henz

**Partitioned versus global Krylov subspace iterative methods for FE solution of 3D Biot's problem**

X. Chen, K.C. Toh and K.K. Phoon

**Friday 2:00pm**

**27 - Advances in algorithms and applications for incompressible and low-Mach number flows, Part IV**

Room: 2-131

Chairpersons: M.A. Christon, D.K. Gartling and M.J. Martinez

**Fractional step methods for the Navier-Stokes equations**

S.W. Armfield

**A finite element projection method for low-Mach number reacting flows**

M.A. Christon and R.S. Patil

**Friday 2:00pm**

**66 - Multi-scale modeling of material behavior – Solids, Part IV**

Room: 2-136

Chairpersons: R. Radovitzky and A. Cuitino

**Diffusion mechanism at grain boundaries in two-dimensional metals**

G.M. Poletaev, R.Y. Rakitin and M.D. Starostenkov

**Hierarchical multiscale computer simulation of microstructure evolution in nanocrystalline materials**

D. Moldovan, K. Rastogi, V. Yamakov and D. Wolf

**Friday 2:00pm**

**49 - Localized drug delivery, Part II**

Room: 2-139

Chairpersons: A.R. Tzafiriri and G. Ledezma

**Strut position, blood flow, and drug deposition: implications for single and overlapping drug-eluting stents**

B. Balakrishnan

**Modeling interstitial infusion in anisotropic regions of the spinal cord**

M. Sarntinoranont

**Modeling and design of drug delivery to solid tumors**

R. Tzafiriri

**FRIDAY**

## FRIDAY

### **Computational fluid dynamics simulations for drug delivery applications**

C.-H. Wang

**Friday 2:00pm**

### **76 - Multi-physics coupling in material processing, Part II**

Room: 2-146

Chairpersons: F. Bay and J.-L. Chenot

### **Coupled phenomena in hot and warm deep drawing of quenched steels, of aluminium and of magnesium alloys**

Y. Chastel

(Keynote)-

### **A discrete homogenization technique for graphene sheets**

D. Caillerie, A. Mourad and A. Raoult

### **Freckle suppression in directional solidification of binary and multicomponent alloys using magnetic fields**

D. Samanta and N. Zabaras

### **A coupled thermomechanical, thermal transport and segregation analysis of the solidification of aluminum alloys on molds of uneven surface topographies**

L. Tan, D. Samanta and N. Zabaras

**Friday 2:00pm**

### **9 - Numerical methods for fluid-structure interaction systems, Part V**

Room: 4-270

Chairperson: L. Gastaldi

### **Variations on a theme of immersed boundaries**

C.S. Peskin

(Keynote)

### **Finite-element time-domain simulations of bridge aeroelasticity: Implementation and profiling**

C. Borri, L. Salvatori and W. Zahlten

### **Studies of fluid-structure interaction on light-weight structures**

A. Kupzok, R. Wüchner and K.-U. Bletzinger

### **On the forced dynamics of floating plates**

K.M. Dempsey and I.V. Vasileva

**End of Conference**

