International Conference on Computational Biomechanics and Biology

The 1st IMACS International Conference on Computational Biomechanics and Biology

ICCBB 2007

September 10 – 13, 2007
Plzeň, Czech Republic

University of West Bohemia in Plzeň
Czech Society for Biomechanics
International Association for Mathematics and Computers in Simulation
Institute of Computer Science AS CR
Czech Society for Mechanics

Schedule

The 1st IMACS

International Conference on Computational Biomechanics and Biology

Sponsor:

Plzeňský Prazdroj, a. s.

Schedule Overview

Monday, 10 Sep 2007

9:00 – 13:00	Registration
13:30 – 14:00	Opening Ceremony
14:00 – 16:00	Invited lectures (Room EP110)
16:00 – 16:20	Coffee break
16:20 – 18:00	Sessions (Rooms EU106, EU108)
20:00 – 21:00	Concert (Museum of West Bohemia)

Tuesday, 11 Sep 2007

9:00 – 10:00	Invited lecture (Room EP110)
10:00 – 11:00	Session (Room EP110)
11:00 – 11:20	Coffee break
11:20 – 12:20	Sessions (Rooms EP110, EU108)
12:30 – 14:00	Lunch
14:00 – 15:00	Invited lecture (Room EP110)
15:00 – 16:00	Sessions (Rooms EU106, EU108)
16:00 – 16:20	Coffee break
16:20 – 17:20	Sessions (Rooms EU106, EU108)
18:00 – 20:00	Excursion (Brewery)
20:00 – 23:00	Conference Dinner (Brewery)

Wednesday, 12 Sep 2007

9:00 – 10:00	Invited lecture (Room UF122)
10:00 – 11:00	Session (Room UF122)
11:00 – 11:20	Coffee break
11:20 – 12:20	Session (Room UF122)
12:30 – 14:00	Lunch
14:00 – 15:00	Invited lecture (Room UF122)
15:00 – 16:00	Sessions (Rooms EU106, EU108)
16:00 – 16:20	Coffee break
16:20 – 17:40	Sessions (Rooms EU106, EU108)
17:40 – 18:00	Conference Closing

Thursday, 13 Sep 2007

9:00 – 11:00	Student seminary (Room EU108)
11:00 – 11:20	Coffee break
11:20 – 12:20	Student seminary (Room EU108)
12:30 – 14:00	Lunch
14:00 – 15:00	Student seminary (Room EU108)

13:30 – 14:00   Opening Ceremony

14:00 – 15:00   **Invited lecture (Room EP110)**, chairman: J. Rosenberg
K. Rajagopal
The mechanics of coagulation and lysis of blood

15:00 – 16:00   **Invited lecture (Room EP110)**, chairman: F. Maršík
G. A. Holzapfel
New aspects of physical modeling and computer simulation of blood vessels: patient-specific analysis and future trends

16:20 – 18:00   **Lectures (Room EU106) — Tissue Remodelling**
Chairman: **K. Rajagopal**

16:20 – 16:40   M. S. Mahmood
A numerical algorithm for avascular tumor growth model

16:40 – 17:00   J. Rosenberg, L. Hynčík
Contribution to the simulation of growth and remodelling applied to muscle fibre stimulation

17:00 – 17:20   A. DiCarlo, P. Nardinocchi, L. Teresi, M. Tringelová
The cardiovascular system as an adaptive system: modelling and computational issues

17:20 – 17:40   M. Tringelová, A. DiCarlo, L. Teresi, P. Nardinocchi
Numerical simulation of left ventricle adaptation to mechanical stimuli

17:40 – 18:00   P. Kochová, Z. Tonar, V. M. Matějka, J. Kuncová
Remodeling of aorta in rats with arterial hypertension

16:20 – 18:00   **Lectures (Room EU108) — Locomotion, Muscles and Tendons**
Chairman: **J. Burša**

16:20 – 16:40   I. Veneva, Y. Toshev
Integrated control of ankle-foot orthoses

16:40 – 17:00   M. Vilimek
The musculotendon model including tendon dynamics

17:00 – 17:20   L. Číhalová
Integration of muscle fatigue into muscle model

17:20 – 17:40   L. Iliava-Mitutsova
Development and modeling of biomechatronic system for regeneration of spinal cord locomotion capabilities after traumatic break

17:40 – 18:00   L. Iliava-Mitutsova
3D model of biomechatronic system for foot receptor activation of patient-paraplegics

9:00 – 10:00 **Invited lecture (Room EP110)**, chairman: G. A. Holzapfel
W. Ehlers, N. Karajan, A. Acartürk
Modelling the lumbar spine as a multiphasic, chemically active material

10:00 – 11:00 **Lectures (Room EP110) — Active Processes and Implants**
Chairman: **W. Ehlers**

10:00 – 10:20 J. Pierre, M. Di Betta, C. Oddou
Modelisation of active processes in tissue engineered implants

10:20 – 10:40 Š. Papáček, S. Čelikovský, B. Rehák, D. Štys
Experimental design for parameter estimation of two time-scale model of photosynthesis and photoinhibition in microalgae

10:40 – 11:00 J. Koukalová
FE analyses of the artificial intervertebral disc

11:20 – 12:20 **Lectures (Room EP110) — Knee Joints**
Chairman: **A. DiCarlo**

11:20 – 11:40 J. Daněk, J. Stehlík, P. Vavřík, J. Nedoma, I. Hlaváček, F. Denk
Stress-strain analyses of the variably weight-bearing knee replacements in connection with the different position of the femoral part of TKP

11:40 – 12:00 M. Lanzendörfer, J. Daněk, J. Nedoma, F. Denk
Numerical simulation of the weight-bearing total knee replacements based on the manufacture's CAD geometry

12:00 – 12:20 P. Hlavon, M. Kolar
Stress analysis of the radial head replacements and Souters endoprothesis in elbow joint

11:20 – 12:20   Lectures (Room EU108) — Brain Biomechanics
Chairman: **F. Maršík**

11:20 – 11:40	E. Rohan	
	On homogenization and modelling the cerebral perfusion	
11:40 – 12:00	J. Hemza	
	The bridging vein of brain and the movement of the brain — the anatomical, biomaterial and biomechanical study	
12:00 – 12:20	G. De Riso	
	Mechanical prediction of brain injury due to impact	

14:00 – 15:00   Invited lecture (Room EP110), chairman: J. Křen
T. Matsumoto, A. Fukunaga, K. Narita, K. Nagayama

Mechanical analysis of the aortic wall considering microscopic heterogeneity

15:00 – 16:00   Lectures (Room EU106) — Microbiomechanics and Soft Tissue Modelling I
Chairman: **G. A. Holzapfel**

15:00 – 15:20	J. Burša, R. Lebis, J. Holata	
	Tensegrity FE models of mechanical tests of individual cells	
15:20 – 15:40	J. Vychytil, M. Holeček	
	The simple model of cell prestress maintained by cell incompressibility	
15:40 – 16:00	E. Rohan, V. Lukeš	
	Microstructure based two-scale modeling of arterial wall	

15:00 – 16:00   **Lectures (Room EU108) — Blood Flow and Hydrodynamics I**
Chairman: **T. Matsumoto**

15:00 – 15:20   G. Licskó, G. Bárdossy
Modelling blood flow in veins due to external pressure excitation

15:20 – 15:40   A. Jonášová, J. Vimmr
The influence of geometry on blood flow in a bypass model

15:40 – 16:00   H. Macková, H. Chlup, R. Žitný
Numerical model of steady and pulsatile flow in an elastic tube

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16:20 – 17:00   **Lectures (Room EU106) — Microbiomechanics and Soft Tissue Modelling II**
Chairman: **L. Hynčík**

16:20 – 16:40   P. Šifta
Measurement of viscoelastic properties of soft tissue in spastic syndrome

16:40 – 17:00   R. Melnik
Simulation of RNA silencing pathway for constant and time-decaying transgene transcription rates

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16:20 – 17:00   **Lectures (Room EU108) — Blood Flow and Hydrodynamics II**
Chairman: **J. Křen**

16:20 – 16:40   L. Lobovský
SPH modelling in biomechanics

16:40 – 17:00   M. Brandner, J. Egermaier, H. Kopincová
Augmented Riemann solver for the urethra flow modelling

9:00 – 10:00	**Invited lecture (Room UF122)**, chairman: E. Rohan
	J. Nedoma, J. Daněk
	Dynamic and quasi-static simulations of the function of knee joint and its artificial replacements in 2D and 3D

10:00 – 11:00   **Lectures (Room UF122) — Ear and Temporomandibular Joint**
Chairman: **M. Petrtýl**

10:00 – 10:20	S. A. Ermochenko, G. I. Mikhasev
	Finite difference method in research of the strain-stress state of the reconstructed middle ear
10:20 – 10:40	M. Kalaidjieva, S. Karastanev, P. Polihronov, L. Kouzmanov, Y. Toshev, Le C. H.
	Implant design for the case of ankylosis of the temporomandibular joint
10:40 – 11:00	P. Hliňáková, K. Veličová, T. Dostálová, J. Daněk, J. Nedoma, F. Denk, M. Lanzendörfer, I. Hlaváček
	Temporomandibular joint numerical reconstruction — healthy joint analysis

11:20 – 12:20   **Lectures (Room UF122) — Tissue Remodelling**
Chairman: **C. Oddou**

11:20 – 11:40	M. Petrtýl, J. Danešová
	Regulations of bone density — retardation of osteoporotic processes
11:40 – 12:00	A. Jíra, M. Petrtýl, P. Černý, J. Danešová
	How to minimize the "stress shield" of rigid hip replacements
12:00 – 12:20	M. Petrtýl, J. Lísal, P. Černý, J. Danešová
	Total hybrid replacement of subchondral bone and articular cartilage

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14:00 – 15:00   **Invited lecture (Room UF122)**, chairman: J. Rosenberg

F. Maršík, V. Klika, H. Chlup

Remodelling of living bone induced by dynamical loading and drugs delivery — numerical modelling and clinical treatment

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15:00 – 16:00   **Lectures (Room EU106) — Cardiovascular Biomechanics I**

Chairman: **F. Maršík**

15:00 – 15:20   L. Horný, M. Sara, H. Chlup, R. Žitný

Constitutive behavior of vena cava inferior

15:20 – 15:40   R. Cimrman, E. Rohan

On identification of the arterial model parameters from in vivo measurements

15:40 – 16:00   M. Hulan, H. Chlup, H. Macková, R. Žitný

Noninvasive optical measurement of elastic tube deformations

15:00 – 16:00   **Lectures (Room EU108) — Bones and Cartilage**

Chairman: **W. Ehlers**

15:00 – 15:20   T. Goldmann, H. Seiner, M. Landa

Usage of ultrasonic wave inversion for the determination of bone elastic coefficients

15:20 – 15:40   L. Tomášek, J. Daněk, J. Stehlík, J. Nedoma

Numerical analysis of the long bone with the marrow

15:40 – 16:00   J. Lísal, M. Petrtýl, P. Černý, J. Danešová

Numerical analyses of the collagen fibres orientations in hyaline cartilage — the hyperelastic properties

16:20 – 17:40   **Lectures (Room EU106) — Cardiovascular Biomechanics II**
Chairman: **A. DiCarlo**

16:20 – 16:40   D. Shakirova, J. Křen
Problem of interaction for blood vessel

16:40 – 17:00   F. Moravec, M. Holeček
Two-scales modelling of elastic inclusions floating in a viscoelastic matrix

17:00 – 17:20   G. Grassi, M. Grassi, G. Pontrelli, L. Teresi
A numerical study of a double layer gel paving technology in drug-eluting stent

17:20 – 17:40   S. Převorovská, F. Maršík
Consequences of antiarrhythmic drugs on cardiac energetics

16:20 – 17:40   **Lectures (Room EU108) — Hip Joints**
Chairman: **J. Daněk**

16:20 – 16:40   Z. Horak, P. Mikulenka, V. Baca
Comparison of an inhomogeneous orthotropic and isotropic material models used for FE analyses

16:40 – 17:00   Z. Horák, P. Kubový, M. Stupka, J. Horáková
Influence of mechanical loading on the hip joint — FE analysis and experimental measurement

17:00 – 17:20   P. Burda, M. Čertíková, J. Novotný, J. Šístek
Stress computations of the hip joint replacement using the BDDC method

17:20 – 17:40   J. Vycichl, J. Kunecky, D. Kytýř, J. Jirova
FE analysis of non-uniform cement layer in acetabular cup of hip joint implant

Student Seminary

9:00 – 10:00   **Seminary lecture (Room EU108) — A. DiCarlo**
The interplay between biochemistry and biomechanics

10:00 – 11:00   **Seminary lecture (Room EU108) — F. Maršík**
Biological application of irreversible thermodynamics — energy and mass transfer in living systems

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11:20 – 12:20   **Seminary lecture (Room EU108) — E. Rohan**
Multi-scale modeling in biomechanics

14:00 – 15:00   **Seminary lecture (Room EU108) — J. Daněk**
Introduction to the mathematical modeling of human joints — geometry of models, construction of FEM meshes, domain decomposition approach

Symbols:

  ⚲ . . . bones
  🧠 . . . brain
  ⚡ . . . crash, impact, multi-body
  ⊞ . . . experiments
  ≈ . . . fluids, flow
  ♪ . . . gait, posture, lower extremities
  ❤ . . . heart
  ⚡ . . . miscelaneous biomechanics
  ⚏ . . . muscles
  ▦ . . . numerical modelling
  φ . . . remodelling, growth, thermodynamical processes
  🔧 . . . replacement, treatment
  ▤ . . . spine
  🔧 . . . vascular system

Insurance and liability

Registered participants agree that the organizers do not take any responsibility for any damages or loses, including medical expenses, suffered or incurred while attending the Conference.