The 1st IMACS International Conference on Computational Biomechanics and Biology

ICCBB 2007

September 10 – 13, 2007
Plzeň, Czech Republic

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. Hyncík

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
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 endoprosthesis 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. Kršen
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

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

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

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. Petrtyl

<table>
<thead>
<tr>
<th>Time</th>
<th>Speakers</th>
<th>Title</th>
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<tbody>
<tr>
<td>10:00 – 10:20</td>
<td>S. A. Ermochenko, G. I. Mikhasev</td>
<td><em>Finite difference method in research of the strain-stress state of the reconstructed middle ear</em></td>
</tr>
<tr>
<td>10:40 – 11:00</td>
<td>P. Hlíňáková, K. Veličová, T. Dostálková, J. Daněk, J. Nedoma, F. Denk, M. Lanzendörfer, I. Hlaváček</td>
<td><em>Temporomandibular joint numerical reconstruction — healthy joint analysis</em></td>
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11:20 – 12:20 Lectures (Room UF122) — Tissue Remodelling

Chairman: C. Oddou

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<td>11:20 – 11:40</td>
<td>M. Petrtyl, J. Danešová</td>
<td><em>Regulations of bone density — retardation of osteoporotic processes</em></td>
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<td>11:40 – 12:00</td>
<td>A. Jára, M. Petrtyl, P. Černy, J. Danešová</td>
<td><em>How to minimize the “stress shield” of rigid hip replacements</em></td>
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<td>12:00 – 12:20</td>
<td>M. Petrtyl, J. Lísal, P. Černy, J. Danešová</td>
<td><em>Total hybrid replacement of subchondral bone and articular cartilage</em></td>
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12 September 2007 Wednesday

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*

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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*


*Numerical analysis of the long bone with the marrow*

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

*Numerical analyses of the collagen fibres orientations in hyaline cartilage — the hyperelastic properties*
### Lectures (Room EU106) — Cardiovascular Biomechanics II
Chairman: A. DiCarlo

<table>
<thead>
<tr>
<th>Time</th>
<th>Presenter(s)</th>
<th>Title</th>
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<tbody>
<tr>
<td>16:20 – 16:40</td>
<td>D. Shakirova, J. Křen</td>
<td>Problem of interaction for blood vessel</td>
</tr>
<tr>
<td>16:40 – 17:00</td>
<td>F. Moravec, M. Holeček</td>
<td>Two-scales modelling of elastic inclusions floating in a viscoelastic matrix</td>
</tr>
<tr>
<td>17:00 – 17:20</td>
<td>G. Grassi, M. Grassi, G. Pontrelli, L. Teresi</td>
<td>A numerical study of a double layer gel paving technology in drug-eluting stent</td>
</tr>
<tr>
<td>17:20 – 17:40</td>
<td>S. Převorovská, F. Maršík</td>
<td>Consequences of antiarrhythmic drugs on cardiac energetics</td>
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### Lectures (Room EU108) — Hip Joints
Chairman: J. Daněk

<table>
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<tr>
<td>16:20 – 16:40</td>
<td>Z. Horáček, P. Mikulienka, V. Baca</td>
<td>Comparison of an inhomogeneous orthotropic and isotropic material models used for FE analyses</td>
</tr>
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<td>16:40 – 17:00</td>
<td>Z. Horáček, P. Kubový, M. Stupka, J. Horáková</td>
<td>Influence of mechanical loading on the hip joint — FE analysis and experimental measurement</td>
</tr>
<tr>
<td>17:00 – 17:20</td>
<td>P. Burda, M. Čertíková, J. Novotný, J. Šístek</td>
<td>Stress computations of the hip joint replacement using the BDDC method</td>
</tr>
<tr>
<td>17:20 – 17:40</td>
<td>J. Výcichl, J. Kunecký, D. Kytýř, J. Jirova</td>
<td>FE analysis of non-uniform cement layer in acetabular cup of hip joint implant</td>
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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*

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*
Appendix

Symbols:

- ⚪️... bones
- 🧬... brain
- 🔄... crash, impact, multi-body
- 🎯... experiments
- 🌈... fluids, flow
- 🎧... gait, posture, lower extremities
- 💔... heart
- 🌿... miscellaneous biomechanics
- 🌟... muscles
- ✨... numerical modelling
- ⌚️... 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.