

Multiscale Methods and Validation in Medicine and Biology II: Biomechanics and Mechanobiology

February 13-14, 2014

Berkeley, California

Sutardja Dai Hall (CITRIS), Room 310, University of California-Berkeley Campus

Thursday, February 13

- 8:15-8:20 Welcome
- 8:20 - 8:40 *Modeling dynamic reorganizations of lipid bilayers*
Marino Arroyo
- 8:40 - 9:00 *Investigation of potential hemodynamics factors influencing thrombus deposition in abdominal aortic aneurysms*
Amirhossein Arzani, Ga Young Suh, Ronald L. Dalman, Shawn Shadden
- 9:00 - 9:20 *Two-Layer Modeling of Red Blood Cells to Explore Hemolysis Pathways and Membrane Dynamics*
Hussein Ezzeldin, Marcos Vanella, Elias Balaras
- 9:20 - 9:40 *Model of Mechanical Signal Transmission via Actin Stress Fibers*
Cecile Gouget, Youngyun Hwant, Abdul Barakat
- 9:40 - 10:00 *A hierarchical multi-scale method to identify skin thermal microenvironment during cauterization*
Elisa Budyn, Sagar Bhogle, Steve Lacey, J. Radosevich, M. Colvard
- 10:00 - 10:20 *Combining Laser Nanosurgery and FRET to Measure the Tention Distribution of Single Stress Fibers at the Cell-Matrix Interface*
Ching-Wei Chang, Sanjay Kumar
- 10:20 - 10:40 Break - Atrium
- 10:40 - 11:00 *Cell-scale Strain fields as patterning factors in organogenesis*
Brian Cox, Malcolm L. Snead, David Smith
- 11:00 - 11:20 *Traction forces in cell mechanics: To 3D and beyond*
Juan C. del Alamo
- 11:20 - 11:40 *The Knowledgebase of Interatomic Models: An online source for standardized testing and long-term warehousing of interatomic models and data*
Ryan Elliott, Eliad Tadmor, James Sethna, Trevor Wennblom, Alexander Alemi, Matthew Bierbaum, Adam Ludvik
- 11:40 - 12:00 *The Mechanics of Chronic Airway Obstruction*
Mona Eskandari, Martin Pfaller, Ellen Kuhl
- 12:00 - 1:00 Lunch - Atrum
- 1:00 - 1:20 *Elasticity and the shape of prevascular tumors*
K.L. Mills, S.S. Rudraraju, R. Kemkemer, Krishna Garikipati

- 1:20 - 1:40 *Modeling invasive cellular growth*
Amir Sanati Nezhad, Ghanbari Mahmood, Mutukumaran Packirisamy, Anje Geitmann
- 1:40 - 2:00 *MRI strain-based validation of patient-specific computational models of human hearts*
Martin Genet, Lik Chuan Lee, Rebecca Ngyuen, Zhihong Zhang, Liang Ge, Julius Guccione
- 2:00 - 2:20 *Changing Material Properties of the Remodeling Tree Shrew Scelera in Myopia*
Rafael Grytz, John T. Siegwart, Thomas Norton
- 2:20 - 2:40 *Signatures of protein structure in the organization and cooperative function of mechanosensitive membrane proteins*
Osman Kahraman, William Klug, Christoph Haselwandter
- 2:40 - 3:00 *Effects of Streaming and piezoelectric potential on electroviscous flow in a lacunar-canalicular channel*
Sungki Min, Hunhee Kim, Junghwa Hong
- 3:00 - 3:20 Break - Atrium
- 3:20 - 3:40 *Whole heart cardiac electromechanics: Verification and Validation Criteria*
S. Krishnamoorthi, L.E. Perotti, O.A. Ajijola, NP. Borgstrom, A. Garfunkel, D.B. Ennis, William Klug
- 3:40 - 4:00 *A thermodynamically consistent finite deformation model for the coupled diffusion in double network gels at a swollen reference*
Andreas Krischok, Christian Lender
- 4:00 - 4:20 *Force-Dependent Mechanical Properties of Dendritic Actin Networks*
Tai-De Li, Peter Bieling, Dyche Mullins, Daniel Fletcher
- 4:20 - 4:40 *A non-equilibrium thermodynamic treatment of the mechano-chemistry governing cytoskeletal force generation*
Mirko Maraldi, Krishna Garikipati
- 4:40 - 5:00 *Effect of protein-induced spontaneous curvature on membrane surface tension*
Kranthi Mandadapu, Padmini Rangamani, George Oster
- 5:30 **Workshop Dinner – Berkeley Faculty Club**

Friday, February 14

- 8:00 - 8:20 *Multiscale Mechanobiology of the Nuclear Pore Complex*
R. Moussavi-Baygi, S. Mahboobi, M. Azimi, M. Peyro, M. Soheilypour, M.R.K. Mofrad
- 8:20 - 8:40 *Tensional homeostasis in single fibroblasts*
Win Pin Ng, Kevin D. Webster, Daniel A. Fletcher
- 8:40 - 9:00 *Multiscale Mechanics of the Intervertebral Disc*
Grace O'Connell
- 9:00 - 9:20 *The Dynamics of Trees: Growth and Stability*
Oliver O'Reilly
- 9:20 - 9:40 *Biomechanical Imaging and its Applications in Biomechanics and Mechanobiology*
Tengxiao Liu, Elizabete R. Ferreira, D. Thomas Seidl, Paul Barbone, and Assad A. Oberai
- 9:40 – 10:00 *Topology optimization for designing patient-specific macroscopic craniofacial implant and current effort in microstructure design*
Jaejong Park, Alok Sutradhar, Michael Miller
- 10:00 – 10:20 *What drives conformational strain in viruses?*
Luigi Perotti, William Klug, Ankush Aggarawal, J. Rudnick, R. Bruinsma
- 10:20 - 10:40 Break - Atrium
- 10:40 - 11:00 *A New Continuum Model Incorporating Patient-Specific Statistical Fiber Orientations Provides Insight on Structure-Function Relation*
David Pierce, Michael Unterberger, Werner Trobin, T. Ricken, G.A. Holzapfel
- 11:00 – 11:20 *Electrostatic effects in the mechanics of cell membranes*
Prashant Purohit
- 11:20 – 11:40 *Modeling flow-diverter stents with image-based CFD*
Vitaliy Rayz, Gabriel Acevedo-Bolton, Van Halbach, David Saloner
- 11:40 – 12:00 *A Two-Scale Fully Coupled Function-Perfusion Model for Liver Lobules Including Anisotropic Perfusion and Hepatic Cell Metabolism*
Tim Ricken, Daniel Werner, Hergo Holzhutter, M. Konig, U. Dahmen, O. Dirsch
- 12:00 - 1:00 Lunch – Atrium
- 1:00 – 1:20 *A computational multiscale modelig approach for fibrillar adhesives*
Roger A. Sauer, Janine C. Mergel
- 1:20 – 1:40 *Flow physics in the human left ventricle*
Shawn Shadden, Sahar Hendabadi, Juan Carlos del Alamo
- 1:40 – 2:00 *Physical Modeling of Chromosome Segregation in Bacteria Reveals Impact of Force and DNA Relaxation*
Thomas Lampo, Nathan Kuwada, Paul Wiggins, Andrew Spakowitz

- 2:00 – 2:20 *Cellular Pressure and Volume Regulation and Implications for Cell Mechanics and Cell Motility*
Hongyuan Jiang, Kimberly Stroka, Konstantino Konstantopoulos, Sean Sun
- 2:20 – 2:40 *Experimental and computational investigations into cooperative cargo transport by mixtures of kinesins from different families*
Goker Arpag Shankar Shastry, William O. Hancock, Erkan Tuzel.
- 2:40 – 3:00 *Validation and Uncertainty Quantification for Macroscale Soft Tissue Constitutive Models*
Kumar Vemaganti, Bhargava Sista, Sandeep Madireddy
- 3:00 - 3:20 Break - Atrium
- 3:20 – 3:40 *Model of Aneurysmal Enlargement Based on Biomechanical Processes in Intraluminal Thrombus*
Lana Virag, John Wilson, Vedran Vindis, Igor Karsaj, Jay D. Humphrey
- 3:40 – 4:00 *Electromagnetic and biotissue across multiple frequency and intensity regimes*
Tarek Zohdi