



7TH INTERNATIONAL CONFERENCE ON FUNCTIONAL IMAGING AND MODELING OF THE HEART

FIMH 2013 CONFERENCE PROGRAM

Thursday 20th June

08.30	Registration <i>Reception Hall</i>
09.00 - 10.00	Opening remarks Keynote speaker – Charles Taylor <i>Lecture Theatre</i>
10.00 – 10.45	Oral session: Image driven modeling <i>Lecture Theatre</i> Chairs: Tammo Delhaas and Bart Bijmens <ol style="list-style-type: none">1. Fusion of Local Activation Time Maps and Image Data to Personalize Anatomical Atrial Models <i>Martin Krueger, Gunnar Seemann, Kawal Rhode, Frank Weber, Nick Linton, Steven Williams, Jaswinder Gill, Christopher Rinaldi, Mark O'Neill, Reza Razavi, and Olaf Dössel</i>2. Initial experience with a dynamic imaging-derived immersed boundary model of human left ventricle. <i>Hao Gao, Boyce Griffith, Leon H. Charney, David Carrick, Christie McComb, Colin Berry, and Xiaoyu Luo</i>3. 2D intracardiac flow estimation by combining speckle tracking with Navier-Stokes based regularization: a study with dynamic kernels. <i>Hang Gao, Nathalie Bijmens, Damien Coisne, Mathieu Lugiez, Marcel Rutten and Jan D'hooge</i>
10.45 – 11.15	Coffee break <i>Lower Atrium</i>
11.15 – 12.15	Oral session: Biophysical modeling <i>Lecture Theatre</i> Chairs: Michael Sacks and Sherif Makram-Ebeid <ol style="list-style-type: none">1. A Computational Bilayer Surface Model of Human Atria. <i>Simon Labarthe, Edward Vigmond, Yves Coudière, Jacques Henry, Hubert Cochet, and Pierre Jaïs</i>2. The Effect of Active Cross-fiber Stress on Shear-induced Myofiber Reorientation. <i>Marieke Pluijmert, Peter Bovendeerd, Wilco Kroon, and Tammo Delhaas</i>3. Effect of fibre orientation optimisation in an electromechanical model of left ventricular contraction in rat. <i>Valentina Carapella, Rafel Bordas, Pras Pathmanathan, Jurgen Schneider, Peter Kohl, Kevin Burrage, and Vicente Grau</i>4. Comparison of Changes in Effective Electrical Size with Activation Rate between Small Mammalian and Human Ventricular Model. <i>Yolanda Hill, Gernot Plank, Nic Smith, and Martin Bishop</i>

12.15 - 14.00	Lunch <i>Lower Atrium</i>
14.00 - 14.45	Keynote speaker 2 - Nicholas Ayache <i>Lecture Theatre</i>
14.45 - 15.15	Poster teaser session - Chairs: Martyn Nash and Arun Holden <i>Lecture Theatre</i>
15.15 - 16.45	<p>Poster session <i>Lower Atrium</i></p> <p>Chairs: Martyn Nash and Arun Holden</p> <ul style="list-style-type: none"> • Image Analysis <ol style="list-style-type: none"> 1. Detecting rat heart myocardial fiber directions in x-ray microtomography using coherence-enhancing diffusion filtering. <i>Birgit Stender and Alexander Schlaefer</i> 2. Fast Fully Automatic Segmentation of the Myocardium in 2D cine MR Images. <i>Sandro Queirós, Daniel Barbosa, Brecht Heyde, Pedro Morais, Denis Friboulet, Piet Claus, Olivier Bernard, and Jan D'hooge</i> 3. Cardiac Microstructure Estimation from Multi-photon Microscopy Images. <i>Babak Ghafaryasl, Bart Bijnens, Erwin van Vilet, Fátima Crispi, and Rubén Cardenes.</i> 4. Atlas construction for cardiac velocity profiles segmentation using a lumped computational model of circulatory system. <i>Vedrana Balicević, Hrvoje Kalinić, Sven Loncarić, Maja Cikeš, Georgina Palau, Catalina Tobon-Gomez, and Bart H. Bijnens.</i> 5. Similarity Retrieval of Angiogram Images based on a Flexible Shape Model. <i>Tanveer Syeda-Mahmood, Colin Compas, David Beymer, and Ritwik Kumar</i> • Biophysical modeling <ol style="list-style-type: none"> 1. Fast Simulation of Mitral Annuloplasty for Surgical Planning. <i>Neil A. Tenenholtz, Peter E. Hammer, Assunta Fabozzo, Eric N. Feins, Pedro J. del Nido, and Robert D. Howe.</i> 2. Effects of anodal cardiac stimulation on V_m and Ca_i^{2+} distributions: a Bidomain study. <i>Piero Colli Franzone, Luca F. Pavarino, and Simone Scacchi .</i> 3. Understanding Prenatal Brain Sparing by Flow Redistribution based on a Lumped Model of the Fetal Circulation. <i>Patricia Garcia-Canadilla, Paula Rudenik, Fatima Crispi, Monica Cruz-Lemini, Georgina Palau, Eduard Gratacos, and Bart H. Bijnens.</i> 4. Personalization of cardiac fiber orientations from image data using the Unscented Kalman Filter. <i>Andreas</i>

Nagler, Cristóbal Bertoglio, Michael Gee, and Wolfgang Wall.

5. **Patient-Specific Modeling of Heart Valves: From Image to Simulation.** *Ankush Aggarwal, Vanessa S. Aguilar, Chung-Hao Lee, Giovanni Ferrari, Joseph H. Gorman, Robert C. Gorman, and Michael S. Sacks.*

- **Cardiac Imaging**

1. **High resolution extraction of local human cardiac fibre orientations.** *François Varray, Lihui Wang, Laurent Fanton, Yue-min Zhu, and Isabelle E. Magnin.*
2. **Three-modality Registration for Guidance of Minimally Invasive Cardiac Interventions.** *James Housden, Mandeep Basra, YingLiang Ma, Andrew P. King, Roland Bullens, Nick Child, Jaswinder Gill, Christopher A. Rinaldi, Victoria Parish, and Kawal S. Rhode.*
3. **Noninvasive Localization of Ectopic Foci: a New Optimization Approach for Simultaneous Reconstruction of Transmembrane Voltages and Epicardial Potentials.** *Danila Potyagaylo, Max Segel, Walther HW Schulze, and Olaf Dössel*

16.45 - 17.30

Oral session: Image Analysis

Lecture Theatre

Chairs: Ivana Isgum and Hervé Delingette

1. **Multi-Atlas Propagation Whole Heart Segmentation from MRI and CTA Using a Local Normalised Correlation Coefficient Criterion.** *Maria A. Zuluaga, M. Jorge Cardoso, Marc Modat, and Sébastien Ourselin*
2. **An image-based catheter segmentation algorithm for optimized electrophysiology procedure workflow.** *Maxime Cazalas, Vincent Bismuth, and Régis Vaillant*
3. **Fast Left Ventricle Tracking in 3D Echocardiographic Data Using Anatomical Affine Optical Flow.** *Daniel Barbosa, Brecht Heyde, Thomas Dietenbeck, Denis Friboulet, Jan D'hooge, and Olivier Bernard*



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Friday 21th June

09.00 - 09.45	Keynote speaker - Nassir Marrouche <i>Lecture Theatre</i>
09.45 - 10.45	Oral session: Parameter Estimation <i>Lecture Theatre</i> Chairs: Robert Howe and Robert McLeod <ol style="list-style-type: none">1. Kalman Filter with Augmented Measurement Model: an ECG Imaging Simulation Study. <i>Walther H.W. Schulze, Francesc Elies Henar, Danila Potyagaylo, Axel Loewe, Matti Stenroos, and Olaf Dössel.</i>2. Estimation of in vivo myocardial fibre strain using an architectural atlas of the human heart. <i>Christopher Casta, Vicky Y. Wang, Yue-min Zhu, Brett R. Cowan, Pierre Croisille, Alistair A. Young, Martyn P. Nash, and Patrick Clarysse.</i>3. Changes in In Vivo Myocardial Tissue Properties due to Heart Failure. <i>Vicky Y. Wang, Alistair A. Young, Brett R. Cowan, and Martyn P. Nash.</i>4. Estimation of Conductivity Tensors from Human Ventricular Optical Mapping Recordings. <i>John Walmsley, Gary R. Mirams, Igor R. Efimov, Kevin Burrage, and Blanca Rodriguez</i>
10.45 - 11.15	Coffee break <i>Lower Atrium</i>
11.15 - 12.15	Oral session: Modeling methods <i>Lecture Theatre</i> Chairs: Ptarick Clarysse and Alistair Young <ol style="list-style-type: none">1. Data-Driven Reduction of a Cardiac Myofilament Model. <i>Tommaso Mansi, Bogdan Georgescu, Jagir Hussan, Peter J. Hunter, Ali Kamen, and Dorin Comaniciu</i>2. An Inverse Spectral Method to Localize Discordant Alternans Regions on the Heart from Body Surface Measurements. <i>Jaume Coll-Font, Burak Erem, Alain Karma, and Dana H. Brooks.</i>3. From Medical Images to Fast Computational Models of Heart Electromechanics: An Integrated Framework towards Clinical Use. <i>Oliver Zettinig, Tommaso Mansi, Bogdan Georgescu, Saikiran Rapaka, Ali Kamen, Jan Haas, Karen Frese, Farbod Sedaghat-Hamedani, Elham Kayvanpour, Ali Amr, Stefan Hardt, Derliz Mereles, Henning Steen, Andreas Keller, Hugo A. Katus, Benjamin Meder, Nassir Navab, and Dorin Comaniciu</i>4. Dimensional reduction of cardiac models for effective validation and calibration. <i>Matthieu Caruel, Radomir Chabiniok, Philippe Moireau, Yves Lecarpentier, and Dominique Chapelle</i>

12.15 - 14.00	Lunch <i>Lower Atrium</i>
14.00 - 14.30	Poster teaser session - Chairs: Luca Pavarino and Mathieu De Craene <i>Lecture Theatre</i>
14.30 - 16.00	<p>Poster session <i>Lower Atrium</i></p> <p>Chairs: Luca Pavarino and Mathieu De Craene</p> <ul style="list-style-type: none"> • Image Analysis <ol style="list-style-type: none"> 1. Automatic Electrode and CT/MR Image Co-localisation for Electrocardiographic Imaging. <i>YingLiang Ma, Umesh Mistry, Ashley Thorpe, James Housden, Zhong Chen, Walther Schulze, C. Aldo Rinaldi, Reza Razavi, and Kawal S. Rhode.</i> 2. Detection of vortical structures in 4D velocity encoded phase contrast MRI data using vector template matching. <i>Johann Drexler, Haider Khan, Michael Markl, Anja Hennemuth, Sebastian Meier, Ramona Lorenz, and Horst K. Hahn.</i> 3. Myocardial Deformation from Local Frequency Estimation in Tagging MRI. <i>Mark Bruurmijn, Hanne B. Kause, Olena G. Filatova, Remco Duits, Andrea Fuster, Luc M.J. Florack, and Hans C. Van Assen.</i> 4. Spatio-temporal Registration of 2D US and 3D MR images for the Characterization of Hypertrophic Cardiomyopathy. <i>Julián Betancur, Frédéric Schnell, Antoine Simon, François Tavard, Erwan Donal, Alfredo Hernández, and Mireille Garreau.</i> 5. A semi-automatic approach for segmentation of three-dimensional microscopic image stacks of cardiac tissue. <i>Thomas Seidel, Thomas Draebing, Gunnar Seemann, and Frank B. Sachse</i> • Motion modeling <ol style="list-style-type: none"> 1. Influence of the grid topology of free-form deformation models on the performance of 3D strain estimation in echocardiography. <i>Brecht Heyde, Daniel Barbosa, Piet Claus, Frederik Maes, and Jan D'hooge.</i> 2. Cardiac motion and deformation estimation from tagged MRI sequences using a temporal coherent image registration framework. <i>Pedro Morais, Brecht Heyde, Daniel Barbosa, Sandro Queirós, Piet Claus, and Jan D'hooge.</i> 3. Speckle Tracking in Interpolated Echocardiography to Estimate Heart Motion. <i>Ariel Hernán Curiale, Gonzalo Vegas Sánchez-Ferrero, and Santiago Aja-Fernández.</i> 4. Variational Myocardial Tracking from Cine-MRI with Non-linear Regularization: Validation of Radial Displacements vs. Tagged-MRI. <i>Viateur Tuyisenge, Adélaïde Albouy-Kissi, and Laurent Sarry.</i> 5. Improving Efficiency of Data Assimilation Procedure for a Biomechanical Heart Model by Representing Surfaces

as Currents. Alexandre Imperiale, Philippe Moireau, Alexandre Routier, and Stanley Durrleman

- **Modeling Methods**

1. **Surface-based electrophysiology modeling and assessment of physiological simulations in atria.** *Annabelle Collin, Jean-Frederic Gerbeau, Hocini Meleze, Michel Haïssaguerre, and Dominique Chapelle.*
2. **Flow analysis in cardiac chambers combining phase contrast, 3D tagged and cine MRI.** *Radomir Chabiniok, James Wong, Daniel Giese, David Nordsletten, Wenzhe Shi, Gerald Greil, Daniel Rueckert, Reza Razavi, Tobias Schaeffter, and Nic Smith.*
3. **Modelling parameter role on accuracy of Cardiac Perfusion Quantification.** *Niloufar Zarinabad, Amedeo Chiribrigilione, I. f. Hautvast, Andreas Shuster, Jeroen P.H.M. van den Wijngaard, Matthew Sinclair, Nic Smith, Kings College London; Jos A.E. Spaan, Maria Siebes, Marcel Breeuwer, and Eike Nagel.*
4. **Texture Mapping by Isometric Spherical Embedding for the Visualization and Assessment of Regional Myocardial Function.** *Yeziel Lamash, Anath Fischer, and Jonathan Lessick*

16.00 – 17.00

Oral session: Biophysical Modeling

Lecture Theatre

Chairs: Steven Niederer and Dominique Chapelle

1. **Evaluation of different mapping techniques for the integration of electro-anatomical voltage and imaging data of the left ventricle.** *David Soto-Iglesias, Constantine Butakoff, David Andreu, Juan Fernández Armenta, Antonio Berruezo, and Oscar Camara*
2. **Atrial Fibrosis and Atrial Fibrillation: A Computer Simulation in the Posterior Left Atrium.** *Jichao Zhao, Robert Stephenson, Gregory Sands, Ian LeGrice, Henggui Zhang, Jonathan C. Jarvis, and Bruce Smaill.*
3. **Collagen bundle orientation explains aortic valve leaflet coaptation.** *Peter E. Hammer, Christina A. Pacak, Robert D. Howe, and Pedro J. del Nido.*
4. **A High-Fidelity and Micro-Anatomically Accurate 3D Finite Element Model for Simulations of Functional Mitral Valve.** *Chung-Hao Lee, Pim J.A. Oomen, Jean-Pierre Rabbah, Ajit Yoganathan, Robert C. Gorman, Joseph H. Gorman III, Rouzbeh Amini, and Michael S. Sacks*



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Saturday 22nd June

09.00 - 09.45	Keynote speaker – Andrew M. Taylor <i>Lecture Theatre</i>
09.45 - 10.45	Oral session: Image Analysis <i>Lecture Theatre</i> Chairs: Peter Mountney and Olaf Doessel <ol style="list-style-type: none">1. Determination of Atrial Myofibre Orientation using Structure Tensor Analysis for Biophysical Modelling. <i>Marta Varela, Jichao Zhao, and Oleg V. Aslanidi</i>2. Large Scale Left Ventricular Shape Atlas Using Automated Model Fitting to Contours. <i>Pau Medrano-Gracia, Brett Cowan, David Bluemke, J. Paul Finn, João A.C. Lima, Avan Suinesiaputra, and Alistair A. Young.</i>3. Atlases of Cardiac Fiber Differential Geometry. <i>Emmanuel Piuze, Herve Lombaert, Jon Sparring, Gustav J. Strijkers, Adrianus J. Bakermans, and Kaleem Siddiqi.</i>4. Manifold learning characterization of abnormal myocardial motion patterns: application to CRT-induced changes. <i>Nicolas Duchateau, Gemma Piella, Adelina Doltra, Lluís Mont, Josep Brugada, Marta Sitges, Bart H. Bijnens, and Mathieu De Craene</i>
10.45 - 11.15	Coffee break <i>Lower Atrium</i>
11.15 - 12.15	Oral session: Motion Modeling <i>Lecture Theatre</i> Chairs: Oscar Cámara and Maxime Sermesant <ol style="list-style-type: none">1. Intraventricular Dyssynchrony Assessment Using Regional Contraction From LV Motion Models. <i>Avan Suinesiaputra, Brett Cowan, David A. Bluemke, Pau Medrano-Gracia, Daniel C. Lee, João A.C. Lima, and Alistair A. Young.</i>2. Applying a Level Set Method for Resolving Physiologic Motions in Free-Breathing and Non-Gated Cardiac MRI. <i>Ilyas Uyanik, Peggy Lindner, Panagiotis Tsiamyrtzis, Dipan Shah, Nikolaos V. Tsekos, and Ioannis T. Pavlidis.</i>3. Right Ventricular Strain Analysis from 3D Echocardiography by Using Temporally Diffeomorphic Motion Estimation. <i>Zhijun Zhang, David J. Sahn, and Xubo Song</i>4. Regional Analysis of Left Ventricle Function using a Cardiac-Specific Polyaffine Motion Model. <i>Kristin Mcleod, Christof Seiler, Nicolas Toussaint, Maxime Sermesant, and Xavier Pennec</i>
12.15 - 12.30	Closing remarks <i>Lecture Theatre</i>

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