



**EUROPEAN
MECHANICS
SOCIETY**

27-29 June 2011

Faculty of Engineering, University of Cagliari, Cagliari (Italy)

Euromech Colloquium 529

Cardiovascular Fluid Mechanics:

from theoretical aspects to diagnostic and therapeutic support.

ERCOFTAC WORKSHOP SIG 37 2011-01

<http://cvfm.unica.it>

June, 27

09.00-10.00: Registration

10.00-10.15: Opening of the Colloquium

10.15-11.00: Invited Lecture, *Cardiovascular inquiry through imaging and modeling*, P. Kilner
Chair: G. Querzoli

11.00-11.30: Coffee Break

11.30-13.10: Velocimetry toward application

Chair: A. Cenedese / C. Poelma

- *Determining the Wall Shear Stress Distribution at a Model of a Stented Vessel by Micro-Particle-Image-Velocimetry with respect to the Non-Newtonian Characteristics of Blood*
D. Quosdorf, M. Brede, A. Leder, D. Lootz, H. Martin, K.P. Schmitz
- *Fluid-Structure Interaction and Wall Shear-Stress Measurements in an Elastic, Stenosed Vessel using Time-Resolved PIV*
K. Pielhop, K. Kato, M. Klaas and W. Schroder
- *Analysis of the flow field in an ascending aorta by Particle Tracking Velocimetry*
U. Gülan, B. Lüthi, M. Holzner, A. Liberzon, and W. Kinzelbach
- *Steady and pulsatile pipe flows in normal and pathological conditions*
S. Colonia, P. Larseille, G.P. Romano
- *Ultrasound imaging velocimetry: toward clinical application*
C. Poelma, R. van der Mijle, J. M. Mari, M.-X. Tang, P. Weinberg and J. Westerweel

13.10-14.30: Lunch

14.30-16.10: Cardiac Flow A:

Chair: L. Agati / P. Verdonck

- *Quantification of blood flow pattern in the left heart and aorta using the exact solution of unsteady-state Navier-Stokes and Continuity equations for Tornado-like flows of viscous media*
Bokerya L.A., Kiknadze G.I., Gorodkov A.Y., Bogevolnov A.V.
- *3D Echocardiographic Assessment of Right Ventricular Flow Pattern*
J. O. Mangual, F. Domenichini and G. Pedrizzetti
- *Computational Modelling and Analysis of Intracardiac Flows in Normal and Diseased Hearts*
Xudong Zheng and Rajat Mittal
- *Fluid dynamics and stresses in prosthetic-valved devices using direct numerical simulations*
M. D. de Tullio, G. Pascazio, L. Weltert, R. De Paulis and R. Verzicco
- *A Lagrangian Investigation of the Flow inside the Left Ventricle*
S. Espa, M.G. Badas, S. Fortini, G. Querzoli and A. Cenedese

16.10-16.30: Coffee Break

16.30-17.30: Advances in Endovascular Devices

Chair: B. Geurts / U. Morbiducci

- *Evaluation of different stenting techniques in coronary bifurcations*
J. García, F. Manuel, Y. Doce, F. Castro, J. A. Fernández, J. Goicolea and A. Crespo
- *A Structural and Fluid Dynamic Approach to Design a New Tapered Balloon Dedicated to Stenting Procedure in Coronary Bifurcations*
C. Chiastra, S. Morlacchi, G. Dubini, P. Zunino and F. Migliavacca
- *Hemodynamic Impact of Helical Designed Graft versus Straight Conventional Arterio-Venous Loop Grafts*
K. Van Canneyt, G. De Santis, S. Eloit, P. Segers and P. Verdonck
- *CFD analysis of coronary artery with atherosclerosis - pre and post stent-insertion study*
Waqas bin Faateh and Naveed Durrani
- *Hemodynamic effects of endovascular procedures,*
P. Petruzzo, S. Camparini, L. Pibiri, G. Genadiev

18.30-19.30: Welcome Cocktail

June, 28

09.15-10.00: Invited Lecture, Cardiovascular Physiology and Cardiac Flow, P.P. Sengupta

Chair: G. Pedrizzetti

10.00-11.00: Applied Modeling

Chair: I. Avrahami /S. Chevrano

- *Patient-specific closed-loop multiscale modeling of virtual surgeries for the treatment of congenital heart diseases*
Baretta A, Corsini C, Yang W, Marsden AL, Vignon-Clementel IE, Feinstein JA, Hsia T-Y, Dubini G, Migliavacca F, Pennati G
- *Local pressure fluctuations in an occluded artery*
O. Korolkova, J. Alastruey, A. Lowe, J. E. Davies, A. D. Hughes, K. H. Parker and J. H. Siggers
- *Shear Induced Platelet Activation and its Relationship with Blood Flow Topology in Hemodynamic Models of Stenosed Carotid Bifurcation*
D. Massai, G. Soloperto, D. Gallo, Y. Xu, U. Morbiducci

11.00-11.30: Coffee Break

11.30-13.10: Understanding atherosclerosis

Chair: F. Migliavacca / R. Mittal

- *Effect of retrograde flow on wall shear stress properties in pulsatile flows*
Dikla Kersh and Alex Liberzon
- *Tortuosity of Coronary Arteries as a Potential Local Risk Factor for Atherosclerosis*
M. Malvé, A. M. Gharib, Saami Yazdani, M. A. Martínéz, Gerard Finet, M. Doblaré, Renu Virmani, R. I. Pettigrew and J. Ohayon
- *A numerical study of pulsatile blood flow in a patient-specific coronary bypass model*
J. Vimmer, A. Jonàsova and O. Bublik
- *Correlation of atherosclerosis progression with structure of disturbed flows in the right coronary artery*
S.I. Bernad, C. Brisan, E.S. Bernad, T. Barbat and V. Albuлесcu
- *Evaluation Of Mechanical Behaviour Of Two Different Carotid Patches Using “VELOCITY Vector Imaging”*
C.M. De Filippo, G. Tonti, P. Modugno, E. Caradonna, G. Pedrizzetti, F. Alessandrini

13.10-14.30: Lunch

14.30-16.10: Cardiac Flow B:

Chair: G. Tonti / P. Sengupta

- *Hemodynamic Effects of Different Pulmonary Artery Banding, Ascending Aorta and Aortic Coarctation Diameters in the Hybrid Norwood Circulation: A Computational Study*
Corsini C, Cosentino D, Baker CE, Dubini G, Pennati G, Hsia T-Y, Migliavacca F
- *Three-dimensional flow inside the left ventricle model*
S. Fortini, G. Querzoli, S. Espa and A. Cenedese
- *Left Ventricular Vortex in Healthy Hearts, a Clinical Analysis*
S. Cimino, G. Pedrizzetti, G. Tonti, E. Canali, V. Petronilli, and L. Agati
- *Blood Flow in the Human Aorta: from In Vivo 4D Phase Contrast MRI to Computational Hemodynamics*
U. Morbiducci, R. Ponzini, D. Gallo, G. De Santis, C. Negri, D. Tresoldi, D. Massai, M.A. Deriu, P. Segers, B. Verheghe, A. Redaelli and G. Rizzo
- *Hybrid repair of thoracic aorta in chronic dissection: changing in the distal perfusion after the procedures.*
Pacini D., Careddu L., Di Marco L., Pantaleo A., Barberio G., Leone A., Pilato E., Di Eusanio M., Lovato L., Di Bartolomeo R.

16.10-16.30: Coffee Break

16.30-17.30: Modeling Aneurisms

Chair: P. Kilner, R. Verzicco

- *Simulation of Realistic Pulsatile Flow in Cerebral Aneurysms*
J. Mikhal, B. J. Geurts
- *Experimental and Numerical Analysis of the Pressure Field in a Patient-Specific AAA Model with and without Intraluminal Thrombus*
R. Antón, C-Y. Chen, M-Y. Hung, E.A. Finol, and K. Pekkan
- *The Dynamics of Flow and Structure in Fenestrated Endografts for Treatment of Abdominal Aortic Aneurysms*
Idit Avrahami, Tomer Meirson, Moshe Halak, Zehava Blechman, Moshe Brand

17.30-19.00: Round Table, Perspectives of contributions for diagnosis and therapy

20.30: Social dinner

June, 29

9.15-11.00: *Special Session Mechanics of Heart Valves: from Structure to Flow,*

Chair: A. Kheradvar

- *Fluid Dynamic Assessment of Transcatheter Aortic Valve Implantation*
A.N. Azadani, H.A. Dwyer, P.B. Matthews, N. Jaussaud, S. Chitsaz, L. Ge, and E.E. Tseng
- *A computational framework for high resolution simulations of patient-specific left heart hemodynamics with aortic valve prothesis*
T. Le, I. Borazjani and F. Sotiropoulos
- Robert Gorman
- Michael Sacks
- *Experimental Approaches to Assess Heart Valve Performance using Ultra-High-Speed Imaging Method*
A. Kheradvar

11.00-11.30: Coffee Break

11.30-12.50: Basic and applied modeling

Chair: F. Sotiropoulos / G. Pedrizzetti

- *Assesment of the placental blood flow in the growth-restricted fetus*
E.S. Bernad, S.I. Bernad, C. Brisan, V. Albulescu and T. Barbat
- *Hydro-Mechanical Foundations for the Blood Swirling Vortex Flows in Cardio-Vascular System*
S.G. Chefranov, A.G.Chefranov, A.S. Chefranov
- *Experimental study of the asymmetric heart valve prototype*
M. Vukicevic, S. Fortini, G. Querzoli, A. Cenedese G. and G. Pedrizzetti
- *Aging and Hypertension effects on the Aortic Stiffness*
A. Guala

12.50-13.10: Sum-up discussion