



MILAN TOMA, PH.D.

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FIELD OF SPECIALIZATION

Bio-mechanical engineering, Computational biomechanics, Trefftz elements, Hydrated soft tissue, Impact bio-mechanics, Cardiovascular fluid structure interaction, High performance computing

ACADEMIC DEGREES

PH.D.

in Engineering Science, Department of Civil Engineering and Architecture, Instituto Superior Técnico, Technical University of Lisbon, Lisbon, Portugal, Supervisor: Professor João António Teixeira de Freitas

M.SC. (DIST.)

Department of Applied Mechanics and Mathematics, Faculty of Mechanical Engineering, University of Žilina, Žilina, Slovakia, Awarded with distinction

EXPERIENCE

RESEARCH SCIENTIST, RIKEN, TOKYO, JAPAN — 2011-PRESENT

Organ and Body Scale Team, Integrated Simulation of Living Matter Group, Computational Science Research Program, RIKEN (The Institute of Physical and Chemical Research), Advisor: Prof. Shu Takagi, Tokyo, Japan

PROJECT RESEARCHER, UNIVERSITY OF TOKYO, TOKYO, JAPAN — 2009-2011

Oshima Laboratory, Institute of Industrial Science, The University of Tokyo, Advisor: Prof. Marie Oshima, Tokyo, Japan

EXPERIENCED RESEARCHER, ALTAIR DEVELOPMENT FRANCE, PARIS, FRANCE — 2008-2009

Experienced Marie Curie researcher, European Commission, Altair Development France (Marie Curie hosting company), Paris, France

RESEARCH PROJECTS

BIO-SUPERCOMPUTING PROJECT

Organ and Body Scale Team, development of finite element cardiovascular FSI model using strong coupling method and high-order Mooney-Rivlin hyper-elastic material, Tokyo, Japan, 2009-present

MYMOSA - MOTORCYCLE AND MOTORCYCLIST SAFETY - PROJECT

MRTN-CT-2006-035965, Sixth Framework Program (Marie Curie Actions) of the European Union, development of computational models of human body in various pre-crash, crash and post-crash scenarios, Paris, France, 2008/2009

HYBRID-TREFFTZ PROJECT

Development of hybrid-Trefftz finite elements for computational modeling of hydrated soft tissues, Lisbon, Portugal, 2002-2007

FELLOWSHIPS AND HONORS

EXPERIENCED RESEARCHER MARIE CURIE FELLOWSHIP

European Commission, 2008/2009

RESEARCH PH.D. FELLOWSHIP

Fundação para a Ciência e a Tecnologia (Foundation for Science and Technology), Lisbon, Portugal, 2003-2007

THE DEAN'S PRIZE AWARDED TO M.SC. STUDENTS FOR ACADEMIC EXCELLENCE

University of Žilina, Slovakia, 2002

SKILLS

C/C++/C#, OpenGL, Python, Fortran, MPI, HTML/PHP, Matlab, Mathematica, Ansys, Adina, Abaqus, Marc, HyperWorks, Radioss

LANGUAGES

Slovak - native language, English - fluent, Czech - fluent, Portuguese - good, German - good, Japanese - basic

OTHER QUALIFICATIONS

WORKSHOP ON 'INTELLECTUAL PROPERTY RIGHTS'

European Patent Academy, European Patent Office, Munich, Germany, 2008

COURSE ON 'BONE CELL AND TISSUE MECHANICS'

International Centre for Mechanical Sciences - CISM, Italy, 2003

COURSE ON 'MECHANICS AND THERMO-MECHANICS OF RUBBERLIKE SOLIDS'

International Centre for Mechanical Sciences - CISM, Italy, 2002

INVITED LECTURES

HYBRID-TREFFTZ FINITE ELEMENTS FOR COMPUTATIONAL MODELLING OF HYDRATED SOFT

TISSUE The Milano branch of IMATI - Institute of Applied Mathematics and Information Technology, Milan, Italy, December 2008

HYBRID-TREFFTZ STRESS AND DISPLACEMENT ELEMENTS FOR TRANSIENT ANALYSIS OF IN-COMPRESSIBLE SATURATED POROUS MEDIA

The Milano branch of IMATI - Institute of Applied Mathematics and Information Technology, Milan, Italy, December 2008

PUBLICATIONS

MANUSCRIPTS SUBMITTED OR IN ADVANCED STAGE OF PREPARATION

M. Toma, A. Krdey, S. Takagi, and M. Oshima, Strongly Coupled Fluid-Structure Interaction Cardiovascular Analysis with the Effect of Peripheral Network, (in prep.), The University of Tokyo, Institute of Industrial Science, Tokyo, Japan, 2011

M. Toma, Decomposing Strongly Coupled Fluid-Structure Interaction Linear Subsystems based on the Q1/P0 Discretization, (in prep.), RIKEN, Tokyo, Japan, 2011

M. Toma, Parallelizing Fully Implicit Monolithic Fluid-Structure Interaction Solver based on the Q1/P0 Discretization, (in prep.), RIKEN, Tokyo, Japan, 2011

J. A. Teixeira de Freitas, M. Toma, Hybrid-Trefftz Displacement Elements for Incompressible Biphasic Media, (to be submitted), Technical University of Lisbon, Instituto Superior Técnico, Lisbon, Portugal, 2011

REFEREED JOURNALS

M. Toma, F. E. A. Njilie, M. Ghajari, U. Galvanetto: Assessing motorcycle crash-related head injuries using finite element simulations, International Journal of Simulation Modelling, 2010, volume 9, issue 3, pp. 143 – 151 [9 pages]. doi:10.2507/ijimm09(3)3.164

J. A. Teixeira de Freitas, I. D. Moldovan, M. Toma: Mixed and Hybrid Stress Elements for Biphasic Media, *International Journal Computers & Structures*, 2010, Volume 88, Issues 23-24, pp. 1286 – 1299 [14 pages]. doi:10.1016/j.compstruc.2009.01.015

J. A. Teixeira de Freitas and M. Toma: Hybrid-Trefftz stress elements for incompressible biphasic media, *International Journal for Numerical Methods in Engineering*, 2009, volume 79, issue 2, pp. 205 – 238 [34 pages]. doi:10.1002/nme.2560

J. A. Teixeira de Freitas and M. Toma: Hybrid-Trefftz stress and displacement elements for axisymmetric incompressible biphasic media, *International Journal for Computer Methods in Applied Mechanics and Engineering*, 2009, volume 198, issues 30-32, pp. 2368 – 2390 [23 pages]. doi:10.1016/j.cma.2009.02.023

V. Kompiš, M. Toma, M. Žmindák, M. Handrik: Use of Trefftz functions in non-linear BEM/FEM, *International Journal Computers & Structures*, 2004, volume 82, issue 27, pp. 2351 - 2360 [10 pages]. doi:10.1016/j.compstruc.2004.04.006

CONFERENCE PROCEEDINGS

J.A. Teixeira de Freitas, M. Toma, "Hybrid-Trefftz Displacement Elements for Incompressible Biphasic Media", in B.H.V. Topping, J.M. Adam, F.J. Pallarés, R. Bru, M.L. Romero, (Editors), "Proceedings of the Tenth International Conference on Computational Structures Technology", Civil-Comp Press, Stirlingshire, UK, Paper 299, 2010. doi:10.4203/ccp.93.299

P. Talaia, M. Toma, M. Hajžman, L. Hynčík, F. Njilie: A pedestrian model for accident simulation from the crash until full stop, *ISB2009, XXII Congress of the International Society of Biomechanics*, page 298, Cape Town, South Africa, July 5-9, 2009

M. Toma, J. A. Teixeira de Freitas: Hybrid-Trefftz stress and displacement elements for transient analysis of incompressible saturated porous media, in *Proc. of the Leuven Symposium on Applied Mechanics in Engineering, The Trefftz workshop, Leuven, Belgium, March 31 - April 2, 2008*

J. A. Teixeira de Freitas, I. D. Moldovan, M. Toma: Mixed and hybrid stress elements for biphasic media, in *Proc. of the Fifteenth UK Conference of the Association of Computational Mechanics in Engineering*, B.H.V. Topping (Editor), Civil-Comp Press, paper 4, Stirlingshire, Scotland, 2007

J. A. Teixeira de Freitas, I. D. Moldovan, M. Toma: Trefftz spectral analysis of biphasic media, in *Proc. of the Sixth World Congress on Computational Mechanics in conjunction with the Second Asian-Pacific Congress on Computational Mechanics*, Beijing, China, September 5-10, 2004, pp. 678-683

M. Toma, V. Kompiš: Use of Trefftz functions in modelling of point and line contact, in *Proc. of the Second MIT Conference on Fluid and Solid Mechanics*, June 17-20, 2003, Ed. K.-J. Bathe, Elsevier, Boston, 2003, pp. 690-692. doi:10.1016/B978-008044046-0.50170-6

V. Kompiš, M. Toma: Reciprocity based Trefftz solutions for non-linear problems, in *Proc. of 3rd International Workshop on Trefftz Method*, Exeter, UK, September 16-18, 2002

THESES

Toma, M. (2007). Modelling of hydrated soft tissues using hybrid-Trefftz finite elements. Lisbon, Portugal [Ph.D. thesis]: Technical University of Lisbon, Instituto Superior Técnico, 228 p.

Toma, M. (2002). Solving of non-linear problems using Trefftz functions (In Slovak). Žilina, Slovakia [M.Sc. thesis]: University of Žilina, Faculty of Mechanical Engineering, 67 p.