Biography of Patrizia Trovalusci

Youth and Career

Patrizia Trovalusci was born in Rome (Italy) in 1961. Her original background was in Architecture, where she got her Master degree with a thesis: *'Diocletian Baths. Directions of investigation for a monument. Structural Aspects and Mathematical Formulations'* at Sapienza University of Rome, in which, among all, she developed an original computer code for the structural analysis of masonry vaults based on the solution proposed by Alberto Castigliano for the so-called «solides imparfaitement élastiques». More precisely her course of study always aimed at creating a bridge between the 'two cultures', scientific and humanistic.

Following this track, the first years of Patrizia's research activity were dedicated to the study of the problems concerning the acquisition of a specific mathematical instrumentation for the analysis of the mechanical behavior of ancient masonry structures. In particular, she participated in a study campaign, promoted by the Archaeological Superintendence of Salerno, for the restoration of the temple of Athena in Paestum, personally taking care of issues concerning mechanical modelling and calculation models for specific structural analyses. In parallel, she deepened some experimental aspects by collaborating on dynamic tests performed on models of the Coclid columns and other static tests on block masonry panels. The interdisciplinary nature of the topic, between the mechanics of the structures and the restoration of the monuments, constitutes the guiding thread also of the PhD thesis (*Mathematical Models for Block Masonry Considered as A System with Micro-Structure*). During the PhD course, at the University of Florence (Italy), she had the opportunity to deepen some general topics concerning the mechanics of solids and structures and the final dissertation also present some original modelling proposals developed within the framework of generalized (non classical) continuum theories, that allow one to take into account of brick/block size, orientation and texture.

In July 1992 Patrizia won the national competition as Assistant Professor of Solids and Structural Mechanics at Sapienza University of Rome. In July 2000 was eligible as Associate Professor of Solids and Structural Mechanics, in a comparative evaluation procedure announced by the University of Palermo (Faculty of Engineering), and since November 2000 she served as a tenured Associated Professor at the Department of Structural and Geotechnical Engineering of Sapienza. On 2012, she obtained the National Academic Qualification as Full Professor and on March 2016 she became a tenured Full Professor of *Solids and Structural Mechanics*. On November 2019 she was elected as Director of the *PhD Program in Structural and Geotechnical Engineering* at Sapienza.

Patrizia loves dance, in particular she has always studied and still studies classical dance, music, art and architecture and she has always been a traveler. She is married since 1990 and has two sons.

Research Activity and Services to the Scientific Community

Since about the early Nineties, Patrizia Trovalusci is a highly independent, profound, and serious scholar in the area of Mechanics of Materials and Structures, where she has made outstanding contributions through fundamental and applied research, teaching, and an ever increasing, worldwide recognized, leadership.

Patrizia's fundamental research encompasses a variety of topics concerned with computational methods for non-classical continua, masonry materials and structures, composites, multiscale modeling, theory of plasticity and non-standard limit analysis, non-linear finite element analysis, structural architecture.
Moving from her early studies on classical and micropolar continua for brick masonry and lattices, Patrizia has established a comprehensive multifield and multiscale framework for the aware modeling of composites in a computational perspective, with meaningful applications to damaged materials and masonry structures, and with consideration of also random particle composites. Such a modern perspective of advanced discrete−continuum theories of materials with microstructures also allowed her to originally revisit molecular approaches in classical elasticity, as per Patrizia's constantly underlying interest towards the historical roots of mechanics.
A constant attitude in Patrizia's vision consists in building advanced models for the analysis and description of complex materials, in view of their efficient computational exploitation for modern engineering applications. In 2017, Patrizia received the *International Computational Methods Award from* ICCM. In 2018 she received the Nomination for the Blaise Pascal Medal for Academicians of European Academy of Science, February (by Giulio Maier) and then the 2018 Nomination to be a member of 'Accademia dei XL' (second classified), March (by Giulio Maier)
Patrizia published fundamental papers in a variety of prestigious archival journals in the area of solid and structural mechanics including, among others: *Meccanica, International Journal of Solids and Structures, International Journal of Damage Mechanics, International Journal for Multiscale Computational Engineering, Acta Mechanica, Archive of Applied Mechanics, Archive for History of Exact Sciences, Journal of Applied Mechanics, Acta Mechanica, European Journal of Mechanics A/Solids, Computational Material Science, Continuum Mechanics and Thermodynamics, Computational Mechanics, Composites Part B: Engineering; ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part B: Mechanical Engineering; Frontiers in Materials.* She also contributed to chapters in several edited volumes and articles in many conference proceedings and edited eight journal special issues and two Springer volumes.
Concerning professional activities, Patrizia is serving as Associate Editor for the *Journal of Optimization Theory and Applications*, and as Lead Editorial Board Member *of International Journal for Multiscale Computational Engineering*, besides being an Editorial Board member of other prestigious journals. She has given Plenary/Keynote/Invited lecturers at several international events and has organized minisymposia, workshops, and advanced courses within different conference series and societies (ICCM, EMMC, WCCM, ECCM, ICSA, CISM) on several topics (among this 16 editions of '*Multiscale and Multiphysics Modelling for "Complex" Materials'*). On August 2018, she was the Chairman of the *9th International Conference on Computational Methods* (ICCM2018) in Rome, under the auspices of AIMETA (Italian Association of Theoretical and Applied Mechanics) and Sapienza University of Rome. She is also the Principal Guest Editor of several Special Issues of prestigious international journals, the last ones: 'Multiscale and Multiphysics Modeling of "Complex" Materials and Engineering Applications, *International Journal for Multiscale Computational Engineering*; 'Computational Optimization for Structural Engineering Applications', *Journal of Optimization Theory and Applications (JOTA);* 'Computational Models for "Complex" Materials and Structures', *Meccanica;* 'Recent Advances in Computational Strategies for Fracture and Damage Detection in Masonry Structures', *Fracture and Structural Integrity (FSI).*
Among the many academic activities at the School of Architecture and Engineering of Sapienza University of Rome, it is worth mentioning her long lasting and highly fruitful service as Coordinator of the Bachelor Degree Courses in Science of Architecture, Techniques of Architecture and Construction, Restoration and Conservation of Monuments.
It also worth to highlight one more characterizing, and indeed unique, aspect of the rich personality of Patrizia who, although turned into an outstanding scholar of mechanics, has never forgotten her origins related to architecture. It is indeed important to also mention Patrizia's scientific achievements on the fruitful relations among mechanics of solids and structures, mathematics, and the historical and contemporary architectural design. In this realm, Patrizia has contributed both innovative studies and successful international initiatives on the matter of "Tectonics" in Architecture, as an autonomous research field at the crossroad between Aesthetics and Ethics. Such outcomes conceived in the perspective of a highly fertilizing encounter between advanced technological sciences and cultural needs of the human society.

MAIN RESEARCH TOPICS: • mechanics of continua with microstructure • multiphase materials • multiscale constitutive models • molecular theory of elasticity • homogenization and damage theories • wave propagation in elastic media • finite element analysis in the presence of constitutive non-linearity • plasticity theory, limit analysis and mathematical programming • history of mechanics • relations between mechanics and architecture

NUMBER OF PUBLICATIONS and DISSEMINATION: Int Journals (48); Volumes/Monographs (10); Articles in Volumes (33), Int Congr Proc (63), Nat. (36). H index 18 (ISI-WOS, Scopus); Tot. Cits. 907 (Scopus)

AWARDS: °International Computational Method Award (ICCM 2017). °Nomination for the Blaise Pascal Medal for Academicians of European Academy of Science (2018); Nomination to be a member of 'Accademia dei XL' (2018, second classified) °2015 Highly Cited Award from ISI-WOS for the publication: P. Trovalusci et al., 'Scale-dependent homogenization of random composites as micropolar continua', Eur J Mech A/Solids. 49, 396–407, 2015

ORGANIZATION-CHAIR/ADVANCED COURSES/LECTURES: CONFERENCES: •Int Conf Comput Meth ICCM10 (Singapore, 2019), Co-Chairman. •Int Conf Comput Meth ICCM9 (Rome, Italy2018). Chairman. • Int Conf Comput Meth ICCM8 (Guilin, China, 2017). Co-Chairman for Europe. •Int Conf On the "Tectonics" in Architecture: between Aesthetics and Ethics TAAE5 (Rome, Italy, 2015), Chairman. MINI-SIMPOSIA: (i) Multiscale Multiphysics Modeling Complex Materials: •MMCM11-ICCM9 (Rome, 2018); •MMCM10-WCCM-XIII (New York, USA, 2018); •MMCM8-ICCM8 (Guilin, China, 2017); •MMCM7-ICCM7 (Berkeley CA, USA, 2016); •MMCM6-ICCM6 (Auckland, New Zealand, 2015); •MMCM5-WCCM (Barcellona, Spagna, 2014) •MMCM4-ECCOMAS (Wien, Austria, 2012); •M2CM2-ECCM (Paris, France, 2010); •MCM/MCM2-THERMEC (Berlin, Germany, 2009); •MMCM-THERMEC (Vancouver, Canada, 2006); (ii) On the "Tectonics" in Architecture between Aesthetics and Ethics: •TAAE3/TAAE2/TAAE1-ICSA (Guimarães, Portugal, 2016/2013/2010); (iii) Comp Multiscale Multifield Modeling Composites: •WCCM/APCOM (Sidney, Australia, 2010) (iv) Advances in Computational Methods of Mechanical Modeling of Materials and Structures: •AC4MS-ICCM8 (Guilin, China, 2017); (vi) Limit Anal Non-Smooth Contact Dynamics of Masonry Structures: •LA/NSCD-ICCM9 (Rome, Italy, 2018); (vii) Polygonal, Polyhedral Virtual Element advanced applications: •P2/VEM-ICCM9 (Rome, Italy, 2018). SPECIAL SESSIONS: •Mechanics of Interfaces and Evolving Microstructures: EMMC16 (Bruxelles, Belgium, 2016). •History of Mechanics: GAMM (Lecce, Italy, 2015). ADVANCED COURSES: •Multiscale Modelling of Complex Materials, Int. Centre for Mechanical Sciences (CISM, Udine, Italy, 2012); •Masonry Constructions, Seismic Safety and Conservation, Doctoral School of Engineering and Architecture (Sapienza, Rome, Italy, 2009)

PLENARY/KEY-NOTE LECTURES: •SIPS 2019 (Schrefler's Int Sym, Cyprus, 2020), Plenary Lecture •Multiscale Innovative Materials Structures •MIMS19 (Cetara, Salerno, 2019), Plenary Lecture •ICCM8 (Guilin, China, 2017), Thematic Plenary Lecture •ICCS23&MECHCOMP6 (Porto, Portugal, 2020), Keynote •MCACM (Copenhagen, Danimarca, 2017), Keynote •Multiscale Innovative Materials Structures MIMS16 (Cetara, Salerno, 2016), Keynote •ICCM7 (Berkeley, CA, USA, 2016), Keynote •EUROMECH 552 (Stuttgart, Germany, 2015), Keynote •GAMM, (Lecce, 2015), keynote •ICCM6 (Auckland, New Zealand, 2015), Keynote • ECCM (Paris, France, 2010), Keynote • CISM, Multiscale Modelling of Complex Materials, 4 Lectures (Udine, Italy, 2012). • Doctoral School of Engineering and Architecture, Masonry Constructions. Seismic Safety and Conservation, 6 Lectures (Sapienza, Roma, 2009)

EDITORIAL BOARD/REVIEWER: °Associate Editor of J Optimization Theory Applications (Springer, 2017-). Lead Editorial Board Member of °Int J Multiscale Computational Engn (Begell House, 2017-). Editorial Board Member of °Civil-Comp 2019; °J Multiscale Multidisciplinary Modeling, Experiments and Design (Springer, 2017-). °2012 J Civil Engn Sci. (2012-). °ISRN Mechanical Engineering Journal (2010). Review Editor of in Mechanics of Materials °Frontiers in Mechanical Engineering and Materials (2017-). °Reviewer for international journals and books (2002-)

GUEST EDITORSHIP:• Special Issues of Int Journals: Int J Multiscale Computational Engn (2019, in press); Journal of Optimization Theory and Appl (JOTA, 2020, forthcoming); Meccanica (2010, in press); Fracture and Structural Integrity (FSI, 14(51), 2020); Meccanica (49(9), 2014); Int J Multiscale Computational Engn (5(2), 2007; 9(5) 2011; 10(6), 2012) • Volumes: °2015 Materials with Internal Structure. Multiscale Multifield Modeling Simulation, Springer. °2014 Multiscale Modeling of Complex Materials. Phenomenological, Theoretical, Computational Aspects, Springer

SCIENTIFIC EVALUATION APPOINTMENTS: °2019- Member of the Assessment Committee for Professorship in Continuum Modelling at DTU Energy, Technical University Denmark. °2018 - ESF College of Expert Reviewers Member °2017- Member of the Scientific Evaluation Panel for the AIMETA Junior Award. Remote Referee for: °2013; 2015 - European Research Council (ERC); °2009 Georgia Nat Science Foundation. °2000- Evaluation Committees for researcher positions

SCIENTIFIC COMMITTEES MEMBERSHIP: °2020 Conf Uncertainty Quantification in Computational Sciences and Engineering (UNCECOMP 2021); °2019, Int Conf on Nonlinear Solid Mechanics (ICoNSoM 2019); Int Conf Uncertainty Quantification in Computational Sciences and Engineering (UNCECOMP 2019); XXIV Conf Italian Association of Theoretical and Applied Mechanics (AIMETA 2019).°2018 Int Sci Comm Eduardo Torroja (Architecture, Engineering and Concrete). °2017-2018 9th Int Conf Comput Meth (ICCM18). °2016 5th Int Workshop Design Civil Environmental Engn (DCEE 2016). °2014-2015 XII Conf Ass Ital Meccanica Theoretical and Applied (AIMETA 2015). °2012-2013 Computational Structuctural Mechanica Association (CSMA). °2013-19 Int Conf Structures and Architecture (ICSA 2013, 2016, 2019). °2006-2011 Int Conf Processing Manufacturing Advanced Materials (THERMEC 2006, 2009, 2011)

SCIENTIFIC SOCIETIES MEMBERSHIP: °2017- Soc Ital Sci Costr (SISCo); °2014- Int Masonry Soc (IMS). °2013- 'Gruppo Italiano Meccanica Materiali' (GMA). °2010- 'Eur Comm Comp Meth Appl Sci (ECCOMASS). °2002- Gruppo Ital Mecc Comp (GIMC)° 1994- 'European Mechanics Society' (EUROMECH). °1992- 'Ass Ital Meccanica Teorica e Applicata' (AIMETA)

FUNDINGS: Coordinator of National Research Projects focused on advanced computational models for complex materials behavior •Roma-Sapienza Unit (PRIN 2010-11; PRIN 2015; PRIN 2017) •Participant to European Funding FP7-245479 (Computational modeling of composites and smart materials, 2010-13). Coordinator of 9 University Research Projects (2010-2018). Coordinator of 8 Faculty Research Projects (1996-2009)

ACADEMIC ISTITUTIONAL and SERVICE APPOINTMENTS (Sapienza): °2010- Coordinator of the Bachelor Degree's Courses: 'Science of Architecture'; 'Techniques of Architecture and Construction'; 'Restoration and Conservation of Monuments', 'Interior Design', School of Architecture (Ex-Quaroni); °2010- Member of the Board of Directors of the 'Centro Ricerca Scienza e Tecnica per la Conservazione Patrimonio Storico-Architettonico' (CISTeC). °2008- Member of the PhD Program in Structural and Geotechnical Engineering, 'Sapienza'. °Other service activities (Department Library Manager, Department and Faculty Member, Member of Research Committees and Faculty Resources and other Faculty and University Commitees)

TEACHING: °BSc, MSc Courses: 'Solid and Structural Mechanics', 'Statics', 'Structural Perfomance of Historical Masonry', School of Architecture, Sapienza, University of Rome. ° Coordinator of the degree 'Atelier of Ecological Islands and Recycling Centers' (LAB-RECYCLING), School of Architecture, Sapienza, University of Rome

WEB-PAGE:
https://sites.google.com/a/uniroma1.it/multiscale-and-multiphysics-modelling-for-complex-materials/

CV complete version:
https://docs.google.com/a/uniroma1.it/viewer?a=v&pid=sites&srcid=dW5pcm9tYTEuaXR8bXVsdGlzY2FsZS1hbmQtbXVsdGlwaHlzaWNzLW1vZGVsbGluZy1mb3ItY29tcGxleC1tYXRlcmlhbHN8Z3g6NjkyMzEyMTY2MmQxMjdlNQ

orcid.org/0000-0001-7946-3590