Patrizia Trovalusci Curriculum Vitae

Sapienza University of Rome, Italy
Department of Structural Engineering and Geotechnics,
https://sites.google.com/a/uniroma1.it/multiscale-and-multiphysics-modelling-for-complex-materials/
https://sites.google.com/a/uniroma1.it/patriziatrovalusci/patrizia.trovalusci@uniroma1.it

• Married with two sons.	**Status**
• 1987 Laurea in Architecture *Cum Laude*, Sapienza University of Rome • 1987-1992 Research Fellow, Department of Structural Engineering and Geotechnics, Sapienza University of Rome. • 1992 PhD in *Structures and Architecture (History of Building Sciences and Techniques)*, University of Florence. • 1992 Assistant Professor of *Solids and Structural Mechanics*, Sapienza University of Rome. • 2000 Associate Professor of *Solids and Structural Mechanics*, Sapienza University of Rome. • 2013 National Academic Qualification as Full Professor of *Solids and Structural Mechanics* • 2016 Full Professor of *Solids and Structural Mechanics,* Sapienza University of Rome.	**Academic background and Position**
• 2019- Director of PhD Program in Structural and Geotechnical Engineering, November 1	**Academic Institutional Appointments**
• Mechanics of non-classical continua; mechanics of masonry materials and structures; mechanics of composite materials; multiscale constitutive models; molecular theory of elasticity; elastic wave propagation; theory of plasticity and non-standard limit analysis; non-linear mathematical programming; non-linear finite element analysis; structural language of architecture.	**Research Areas**
• *Mechanical models for Lagrangian systems with non-linear behaviour*: (a) experimental analysis on block masonry walls; (b) finite element formulation for rigid blocks interacting through non-linear and non-conservative deformable elements; (c) limit analysis of (2D and 3D) rigid block structures with unilateral constraints and friction via mathematical programming. • *Multiscale constitutive models for complex materials as multifield continua:* (a) constitutive functions for generalized continua; (b) block masonry materials as continua with rigid local structure; (c) damaged materials as continuous with affine microstructure (d) composite materials as three fields continua; (e) non-linear behaviour of masonry materials with internal structure. • *The molecular theory of elasticity.* Origins and current developments. • *The "tectonic" or art of building*: the relations among mechanics (of solids and structures), mathematics and, historical and contemporary, architectural design.	**Main Research Directions**

Awards Nominations

- 2017 *International Computational Method Award* (ICCM 2017)
- 2015 Highly Cited Award from ISI-WEB of Knowledge for the paper 'Scale--dependent homogenization of random composites as micropolar continua', *European Journal of Mechanics A/Solids*, 49, 396–407, 2015. [A28]
- 2018 Nomination for the Blaise Pascal Medal for Academicians of European Academy of Science, February (by Giulio Maier)
- 2018 Nomination as member of *Accademia dei XL* (second classified), March 2018 (by Giulio Maier)

Board Memberships

- 2008- Board of the *PhD Program in Structural Engineering,* Department of Structural and Geotechnical Engineering, Sapienza University of Rome.
- 2014- Board of Directors of *Centro Ricerca Scienza e Tecnica per la Conservazione Patrimonio Storico-Architettonico* (*CISTeC*)

Scientific Societies Membership

- 1992- Italian Association of Theoretical and Applied Mechanics (*AIMETA*).
- 1994- European Mechanics Society (*EUROMECH*).
- 2002- Italian Group of Computational Mechanics (*GIMC*).
- 2010- European Community on Computational Methods in Applied Sciences (*ECCOMASS*).
- 2013- Italian Group of Mechanics of Materials (*GMA*)
- 2014- International Masonry Society (*IMS*)
- 2017- Società Italiana di Scienza delle Costruzioni (*SISCo*)
- 2019- International Association of Structures and Architecture

Scientific Committees Membership

- 2006-2009 Scientific Committee of the International Conference on Processing & Manufacturing of Advanced Materials (THERMEC06-09).
- 2006-2009 International Advisory Committee of THERMEC09.
- 2008-2009 Scientific Steering Committee for the Advanced Course of Masonry Constructions: Modelling, Seismic Safety and Conservation of common and monumental Buildings, PhD in Structural Engineering and Doctoral School in Civil Enginering and Architecture, Sapienza University of Rome.
- 2010-2019 Scientific Committee of the 2nd; 3rd; 4th International Conference on Structures and Architecture (ICSA2013; ICSA2016; ICSA2019: http://www.icsa2013.arquitectura.uminho.pt).
- 2011 International Executive Committee of THERMEC11.
- 2012 Scientific Committee of the Computational Structural Mechanics Association (CSMA 2013: http://csma2013.csma.fr/index.php?page=comites.php#csinternational), linked to the European Council of Computational Mechanics (ECCM) and the International Association for Computational Mechanics.
- 2014 Scientific Committee of the XXII Conference of the Italian Association of Theoretical and Applied Mechanics (AIMETA 2015).
- 2016 Int. Scientific Committee of the 5th International Workshop on Design in Civil and Environmental Engineering (DCEE 2016; http://www.dcee2016.eu/).
- 2016 Local Scientific Committee 5th International Conference on Material Modelling (ICMM5; http://www.memocsevents.eu/wordpress/cossevita/icmm5-organizers/).
- 2017-2018 Int. Scientific Advisory Committee of 9th International Conference on Computational Methods (ICCM18, http://www.sci-en-tech.com/ICCM/)
- 2018 Scientific Commettee of the Int. Conference on research in construction EDUARDO TORROJA/AEC (Architecture, Engineering and Concrete). Institute of Construction Sciences Eduardo Torroja. Madrid, Spain, November 21-23
- 2018-19 Scientific Committee of the XXIV Conference of the Italian Association of Theoretical and Applied Mechanics (AIMETA 2019).
- 2018-19 Scientific Commettee of International Conference on Nonlinear Solid Mechanics, (ICoNSoM 2019) 16-19 June 2019, Roma, Italy
- 2018-19 Scientific Commettee of the 3rd International Conference on Uncertainty Quantification in Computational Sciences and Engineering (UNCECOMP 2019), June 22-24, 2019 Crete, Greece.
- 2020-21 Scientific Commettee of the 3rd International Conference on Uncertainty

Quantification in Computational Sciences and Engineering (UNCECOMP 2021), June 21-23, 2021, Athens, Greece.	
• 2010- *ISRN Mechanical Engineering Journal* (http://www.isrn.com/journals/me/editors/, https://www.hindawi.com/journals/isrn/editors/mechanical.engineering/ ISSN 2090-5122 • 2012- *Journal of Civil Engineering and Science* (http://www.ij-ces.org/editorialBoard.aspx, ISSN: 2227-4634, 2227-4626). • 2017- ***International Journal for Multiscale Computational Engineering*** (http://www.begellhouse.com/ii/61fd1b191cf7e96f.pdf?nocache=1505802093 ISSN: 1543-1649) • 2017- *Journal of Multiscale Multidisciplinary Modeling, Experiments, Design* (http://www.springer.com/engineering/mechanics/journal/41939?detailsPage=editorialBoard) • 2017- ***Journal of Optimization Theory and Applications*** *(JOTA).* Associate Editor *(http://www.springer.com/mathematics/journal/10957/PSE?detailsPage=editorialBoard* ISSN: 0022-3239) • 2018- *Frontiers in Mechanical Engineering and Materials.* Review Editor (https://www.frontiersin.org/journals/mechanical-engineering/sections/mechanics-of-materials#)	**Editorial Boards**
• 2006-2007 P. Trovalusci, 'Multiscale Mechanical Modelling of Complex Materials and Engineering Applications', Special Issue of *International Journal for Multiscale Computational Engineering*, **5**(2) • 2009-2011 P. Trovalusci and M. Ostoja-Starzewski, 'Multiscale Mechanical Modelling of Complex Materials and Engineering Applications 2', Special Issue of *International Journal for Multiscale Computational Engineering*, **9**(5). • 2010-2012 P. Trovalusci and B. Schrefler, 'Multiscale Mechanical Modelling of Complex Materials and Engineering Applications 3', Special Issue of *International Journal for Multiscale Computational Engineering*, Special Issue of *International Journal for Multiscale Computational Engineering*, **10** (6). • 2012 - T. Sadowski and P. Trovalusci: *Multiscale and Multiphysics Modelling of Complex Materials. Phenomenological, theoretical and computational aspects*, CISM International Centre for Mechanical Sciences **556**, 'Courses and Lectures' Series, Springer. (Authors: R. de Borst; G. Del Piero; S. Ghosh; M. Ostoia-Starzewski; T. Sadowski; R. Tarleja; P. Trovalusci.). • 2014 - T. Sadowski, P. Trovalusci, B. Schrefler, R. de Borst: 'Multiscale and Multiphysics Modelling for Complex Materials', Special Issue of *Meccanica* , **49**(9). • 2015 - P. Trovalusci: *Materials with Internal Structure. Multiscale and Multifield Modelling and Simulation.'* Springer Tracts in Mechanical Engineering' Series. Springer. (Authors: R. de Borst; G. Del Piero; S. Ghosh; M. Ostoia-Starzewski; T. Sadowski; R. Tarleja; P. Trovalusci.). • 2018-2019 – Int Conf on Computational Methods***. Special Issues***: https://sites.google.com/a/uniroma1.it/multiscale-and-multiphysics-modelling-for-complex-materials/conferences/iccm9-2018-special-issues SI#1. *Multiscale and Multiphysics Modeling of 'Complex' Materials and Engineering* Applications, Int J Multiscale Computational Engineering (JMC). P Trovalusci, with N. Fantuzzi, M.L. De Bellis SI#2. *Advances in Computational Optimization for Structural Engineering Applications.* J Optimization Theory and Applications (JOTA). P Trovalusci and G. Maier, with V. Gattulli SI#3. *Computational Models for 'Complex' Materials and Structures, beyond the Finite Elements*, Meccanica. P. Trovalusci and Cui Fangsen SI#4. *Recent Advances in Computational Strategies for Fracture and Damage Detection in Masonry Structures*, Fracture and Structural Integrity (FSI). P. Trovalusci con M. Monaco, F. Portioli, E. Reccia	**Guest Editorship**
• *Advanced Powder Technology; Applied Mathematical Modelling (ELS); Applied Scinece MDPI; Archive of Applied Mechanics; Composites Part B: Engineering; Composite Structures; Composites Science and Technology; Computer and Geotechnics; Engineering Fracture Mechanics; Engineering Structures; European Journal of MechanicsA/Solids; Frontiers; International Journal of Architectural Heritage; International Journal of Mechanical Sciences; International Journal for Numerical Methods in Engineering; International Journal of Mechanical Sciences; International Journal for Multiscale Computational Engineering; Journal of Civil Engineering and Science; Journal of Optimization Theory and Applications*; *International Journal for Numerical Methods in Engineering; International Journal of Solids and Structures; Journal of Mechanics of*	**Reviewer Journals/ Books**

Materials and Structures; Materials MDPI; Meccanica; Mechanics of Materials;Mechanics Research Communications; Journal of the Brazilian Society of Mechanical Sciences and Engineering; *Waves in Random and Complex Media.* • *Mc-Graw-Hill, Città Studi (Utet).*	
• 2006 Coordinator of the Mini-symposium: *Multiscale Mechanical Modelling of Complex Materials and Engineering Applications*, within the International Conference on Processing & Manufacturing of Advanced Materials (*MCM-THERMEC06*), Vancouver (Canada), July 4-8. • 2009 Principal Coordinator of the Mini-symposium: *Multiscale Mechanical Modelling of Complex Materials and Engineering Applications-2*, within the International Conference on Processing & Manufacturing of Advanced Materials (*MCM2-THERMEC09*), with M. Ostoja-Starzewski, Berlin (Germany), August 25-29 (http://thermec.uow.edu.au/). • 2010 Principal Coordinator of the Symposium: *Multiscale and Multiphysics Computational Methodologies for Complex Materials,* within the 4th European Conference on Computational Mechanics (*M2CM2-ECCM2010*), with T. Sadowski, V. Sansalone and B. Schrefler, Paris (France), May 16-21. • 2010 Coordinator of the Mini-symposium *On the "Tectonics" in Architecture: between Aesthetics and Ethics,* within the 1st International Conference on Structures & Architecture (*TAAE-ICSA2010*). University of Minho, Guimarães (Portugal), July 21-23. • 2010 Co-cordinator of the Mini-symposium: Computational multiscale and multifield modelling of composites, within the 9th World Congress on Computational Mechanics and 4th Asian Pacific Congress on Computational Mechanics (*WCCM-APCOM*), July 19-23, Sydney (Australia). With D. Boso, B. Schrefler. • 2012 Co-coordinator of the Mini-symposium on *Multiscale and Multiphysics Modelling for Complex Materials,* within the European Congress on Computional Methods in Applied Sciences and Engineering (*MMCM4-ECCOMAS2012*), with T. Sadowski, R. de Borst, B. Schrefler, Wien, September 10-14. • 2013 Principal Coordinator (Invited) of the Mini-symposium *On the "Tectonics" in Architecture: between Aesthetics and Ethics* 2, with M. A. Chiorino, within the 2nd International Conference on Structures & Architecture (*TAAE2-ICSA2013*). University of Minho, Guimarães (Portugal), July 24-26. • 2014 Principal Coordinator (Invited) of the Mini-symposium on *Multiscale and Multiphysics Modelling for Complex Materials*, within the 11th World Congress on Computational Mechanics (WCCM XI), the 5th European Conference on Computational Methods (ECCM V) and the 6th European Conference on Computational. Fluid Dynamics (ECFD VI), (*MMCM5-WCCM2014*), Barcelona (Spain) 20-25. Invitation of the Chairpersons E. Oñate, X. Oliver, A. Huerta. With T. Sadowski, B.Schrefler, R. de Borst. • 2015 Principal Coordinator of the Mini-symposium on *Multiscale and Multiphysics Modelling for Complex Materials*, within the 6th International Conference on Computational Methods (*MMCM6-ICCM2015*), Auckland (New Zealand), July 14-17. Invitation by the Onorary Chairman G.R. Liu. With B. Schrefler. • 2015 Co-coordinator (Invited) of the Special Session on *History of Mechanics*, Annual Meeting *Gesellschaft für Angewandte Mathematik und Mechanik* (GAMM2015), Lecce, Italy, March 23-27. Invited by the chairman G. Zavarise. with D. Capecchi , E. Stein. • 2015 **CHAIRMAN** of the Conference: *On the "Tectonics" in Architecture: between Aesthetics and Ethics* (*TAAE2'Roma*). Sapienza University of Rome, School of Architecture, Rome, June 11-13. https://sites.google.com/a/uniroma1.it/patriziatrovalusci/on-the-tectonics-in-architecture-between-aestethics-and-ethics • 2015 Principal Coordinator (Invited) of the Mini-symposium on *Multiscale and Multiphysics Modelling for Complex Materials*, within the 7th International Conference on Computational Methods (*MMCM7-ICCM7*), Berkeley (CA, USA), August 1-4. Invitation by the Onorary Chairman G.R. Liu. With B. Schrefler. • 2016 Principal Coordinator (Invited) of the Mini-symposium *On the "Tectonics" in Architecture: between Aesthetics and Ethics* 3, within the 3rd International Conference on Structures & Architecture (*TAAE3-ICSA2016*). University of Minho, Guimarães (Portugal), July 27-29. With E. Siviero,	**Organization Chair** **Conferences/ Minisimposia/ Special Sessions**

- 2016 Co-coordinator (Invited) of the Special Session on *Mechanics of Interfaces and Evolving Microstructures (including Phase Transformation and Recrystallization)*, within 15th European Mechanics of Materials Conference (*EMMC15*), Bruxelles (Belgium), September 7-9. With R. Logé (EPF Lausanne, Switzerland).
- 2017 **International Co-Chair** (for Europe) of the 8th *International Conference on Computational Methods (ICCM2017),* Guilin (Guangxi, China), July 25-29.
- 2017 Principal Coordinator (Invited) of the Mini-symposium on *Multiscale and Multiphysics Modelling for Complex Materials*, within the *ICCM2017* (*MMCM8*). Ibidem. With B. Schrefler and M. L. De Bellis.
- 2017 Principal Coordinator (Invited) of the Mini-symposium on *Advanced Computational Methods for the Mechanical Modeling of Materials and Structures,* within the *ICCM2017*. (*ACM4S*). Ibidem. With F. Tornabene and N. Fantuzzi. 2016-17.
- 2018 Co-Coordinator (Invited) of the Mini-symposium *Multiscale and Multiphysics Modelling for Complex Materials*, 13th World Congress in Computational Mechanics (*MMCM10-WCCMXIII*), New York (USA), July 22-27. With M. L. De Bellis, A. Bacigalupo, M. Ostoja-Starzewski
- 2018 **CHAIRMAN** of the ***9th International Conference on Computational Methods (ICCM2018).*** Roma (Italy), August 6-10. https://sites.google.com/a/uniroma1.it/multiscale-and-multiphysics-modelling-for-complex-materials/conferences
- 2018 Principal Coordinator of the Mini-symposium *Multiscale and Multiphysics Modelling for Complex Materials*, within the *ICCM2018* (*MMCM11*). Ibidem. With B. N. Fantuzzi, M. L. De Bellis, M. Ostoja-Starzewski
- 2018 Principal Coordinator of the Mini-symposium *Limit Analysis and Non-Smooth Contact Dynamics of Masonry Structures,* within *ICCM2018*. Ibidem. With: F. Portioli, E. Reccia, L. Leonetti.
- 2018 Principal Coordinator of the Mini-symposium *Polygonal, Polyhedral and Virtual Element for advanced applications* within *ICCM2018*. Ibidem. With: E. Artioli, M. Pingaro.
- 2018 Principal Coordinator of the *Mini-symposium Impact of Computational Methods on Architectural Design and Theories* within *ICCM2018*. Ibidem. With: E. Mele, A.I. Del Monaco.
- 2019 **Chairman** of the ***Reassessing Material International Workshop*** and Exhibition (Sapienza-Architettura-AMA / Weimar University Bauhaus-Goethe Institute-Sala1 meeting), Faculty of Architecture, Roma Sapienza (Italy), May 27-28. https://web.uniroma1.it/disg/archivionotizie/reassessing-material
- 2019 **International Co-Chair** *of the 10th International Conference on Computational Methods (ICCM2019).* Singapore, July 9-13.
- 2008 *Two lectures on theories of DNA elasticity: A rapidly evolving branch of the new discipline called Bio-Mechanics*, Seminars by B. C. Coleman (Rutgers University): School of Engineering, Sapienza University of Rome, July 16, 18.
- 2009 *Masonry Constructions. Modelling, Seismic Safety and Conservation of common and monumental Buildings*. Advanced course (coordinated by L. Decanini). Doctoral School of Engineering and Architecture, Sapienza University of Rome, July, October, November .
- 2011 *Fractal Geometry of Materials versus Continuum Mechanics,* seminar by M. Ostoja-Starzewski (Urbana University of Illinois): School of Engineering, Sapienza University of Rome, June 10.
- 2012 *Multiscale Modelling of Complex Materials,* Advanced Course at International Centre for Mechanical Sciences (*CISM*), May 21-25, with T. Sadowski (Lublin University of Technology). Lecturers: G. del Piero (Univ. of Ferrara, Italy); S. Ghosh (Johns Hopkins Univ., MD, USA); M. Ostoja-Starzewski, Univ. Of Illinois at Urbana-Champaign, IL, USA; Ramesh Tarleja – Texas A&M University, TX, USA)., T. Sadowski, P. Trovalusci.
- 2014 *Spherically convergent shear waves during blunt head trauma fractals; Randomness in mechanics of materials,* seminars by M. Ostoja-Starzewski (Urbana University of Illinois), March 14.
- 2015 Course: *Deformation Mechanisms and Modeling Methods in Mechanics of Materials.* By C.R. Picu, Rensselaer Polytechnic Institute, Troy, New York (USA), PhD Program in Structural Engineering, 'Sapienza University of Rome, May-June.

Advanced Courses, Seminars organized (selected)

Conferences/ Lectures/ Keynotes/ Invited Talks Seminars (selected)

- 1990 *La meccanica delle strutture in muratura; il calcolo a rottura per strutture a blocchi con contatti unilaterali con attrito finito; la statica dei sistemi voltati; la storia dei modelli proposti nel XVIII e nel XIX secolo per l'analisi delle fabbriche murarie.* Series of lectures and seminars, School of Architecture, Sapienza University of Rome (invitation by A. Giuffré). January-June.
- 1991 *Sperimentazione e modellazione numerica di pannelli murari.* Seminar, School of Engineering, University of Rome 'Tor Vergata'. Seminar (Invitation by M. Como).
- 1993 *Sulla modellazione dei mezzi murari come sistemi dotati di struttura.* Seminar, School of Engineering, University of Pisa (invitation by S. Bennati). Seminar. October.
- 1994 *I metodi dei vincoli interni e del riscalamento per lo studio dei gusci elastici di spessore sottile,* School of Engineering Sapienza University of Rome. Seminar (Invitation by N. L. Rizzi). February-May.
- 1994 *Murature a blocchi come continui dotati di struttura.* Seminar, School of Engineering, University of Rome 'Tor Vergata'. Seminar (invitation by P. Podio-Guidugli). November.
- 1998 *A molecular approach in the derivation of the constitutive equations for continua with microstructure.* Seminar, Yale University, CN, New Haven, USA. Seminar (invitation by E. T. Onat), July.
- 1998 *Continui multi-campo per la modellazione di mezzi murari ed altri materiali eterogenei.* Seminar, School of Engineering, University of Calabria. Seminar October (invitation by R. Casciaro).
- 2001 *Continuum micropolar modelling of discontinuous masonry-like systems*, 6th Nat. Congr. on Mechanics, Thessaloniki (Greece). Invited Talk (Invitation by E. Aifantis, Aristotle University of Thessaloniki).
- 2003 Elastic waves in microcracked bodies as multi-field materials', *5th European Solid Mechanics Conf.*, Thessaloniki (Greece). Invited Talk. (Invitation by E. Aifantis, Aristotle University of Thessaloniki).
- 2008 *Multiscale-multifield models for the mechanical description of 'complex' materials: origins and current developments*. Seminar, School of Engineering University of Genoa (Invitation by L. Gambarotta). May 29.
- 2008 *The Structural Conception in Architecture. Reflections on the relations among the art of building, structural mechanics, mathematics and architectural design.* 1. The constructive dimension (influence of structural language in 'making' architecture); 2. The mathematical dimension (influence of mechanic-mathematic language in architectural design), Lecture. School of Architecture, University of Genoa, (invitation by L. Gambarotta). May 30.
- 2009 *Mechanical Models for Historic Masonry*. Lectures for the Advanced Course of Masonry Constructions. Modelling, Seismic Safety and Conservation of common and monumental buildings. School of Engineering and Architecture, Sapienza' University of Rome, July, October, November. Notes on the mechanical modelling of masonry. 2. Mechanical models for masonry. 3. Masonry as discontinuous system. 4. Masonry as multiscale/multifield continuum. 5. Origins of the collapse analysis. Elasto-plastic materials. Limit analysis for discrete systems, 4. ALMA, A computer code for the Limit Anaysis of Frictional Masonry. (http://w3.disg.uniroma1.it/corsomuratura09/index.php?option=com_content&task=view&id=26&Itemid=49, password: CFSM09-PATTROVA).
- 2009 *A multiscale-multifield approach to 'complex' materials: theoretical modelling and computational results*, 18th Conference on 'Computer Methods in Mechanics', Zielona-Gora (Poland), May. Invited Talk (invitation by T. Sadowsky, Lublin University of Technology).
- 2010 *A generalized Voigt's approach to multiscale-multifield modelling of "complex" materials*, IV European Conference on Computational Mechanics, Paris, May. **Key-note lecture** (invitation by B. Schrefler, University of Padua).
- 2011 *La concezione strutturale in architettura. Il recupero di un'etica 'tettonica' attraverso la lezione di P.L.* Nervi. two Lectures in:
  - Workshop "Pier Luigi Nervi: l'approccio globale al progetto di architettura", Palazzetto dello Sport – Flaminio, Roma, February 17 (invitation by G. Rega, Sapienza-University of Rome);
  - Workshop "Pier Luigi Nervi – Arte e scienza del costruire", Accademia delle Scienze, Torino, May 2 (invitation by M. A. Chiorino , Torino Polytechnic).
- 2011 *Materials with Flaws and Inclusions: Non-Classical Discrete-Continuum Description*, International Conference on Material Modelling *(ICCM2)*, École des Mines, Paris, August.

Invited Talk (invitation by S. Forest, Mines - Paris Tech).

- 2012 *Molecular approaches for multifield continua. Origins and actual developments with applications to fibre composites and masonry-like materials.* 1. 19th Century molecular models 3. A mention to modern discrete-continuum theories. 3. Multifield continua 4. A Molecular/multifield approach for composites. **Lectures** for the CISM Course 'Multiscale Modelling of Complex Materials', Udine, May 21-25.
- 2013 *Generalized continua for discontinuous complex materials. A Voigt–like approach using the principle of virtual works,* International Conference on Material Modelling *(ICCM3)*, Warsaw (Poland), August. Invited Talk (invitation by S. Forest, Mines - Paris Tech).
- 2014 *Molecular approaches for multifield continua: origins and actual developments with applications to fibre composites and masonry-like materials.* Seminar, School of Engineering Polytechnical University of Marche (invitation by S. Lenci). March 24.
- 2014 *Discrete-to-continuum approaches for complex materials as 'non-simple' continua*, Invited talk at Conv. Meccanica Computazionale e Meccanica dei Materiali (GIMC-GMA), Cassino, June 13.
- 2014 *The recovery of the ethic of constructions: P. L. Nervi vs. S. Musmeci, two structural conceptions compared*. Invited Lecture (by L. Gambarotta). 1rst International Symposium 'Form After Form'. School of Architecture, University of Genoa. September 22.
- 2014 *Molecular approaches for multifield continua: origins and actual developments with applications to fibre composites and masonry-like materials*. Seminar, University of Padua, (invitation by B. Schrefler). November 24.
- 2015 *Discrete to scale-dependent continua for complex materials. A generalized Voigt approach using the principle of virtual power,* Euromech Colloquium 557, Stuttgart (Germany), **Key-note presentation**, March 2 (invitation by the Chair S. Schmauder, University of Stuttgart).
- 2015 *Nineteenth century molecular models with a glance at modern discrete–continuum theories*, of Gesellschaft für Angewandte Mathematik und Mechanik (GAMM) Annual Meeting, Lecce (Italy), March 25. (Invitation by the chair G. Zavarise). **Key-note presentation**.
- 2015 *Considerazioni sulla modellazione meccanica per la muratura storica.* XX anniversary of 'Centro di Ricerca Scienza e Tecnica per la Conservazione del Patrimonio Storico-Architettonico' (CISTeC), School of Engineering, April 17.
- 2015 Conference: *Verso il recupero di un'etica tettonica in architettura: la dimensione tecnologica e la dimensione matematica. Nervi e Musmeci due concezioni strutturali a confronto.* Polytechnical University of Marche School of Civil Engineering and Architecture April 22. (Invitation by G. Mondaini),
- 2015 *Coarse–graining approaches for particulate composites as micromorphic continua*, 6th International Conference on Computational Methods (ICCM2015), **Key-note presentation**, Auckland, New Zealand, July 16 (invitation by the onorary Chairman G.R. Liu, President of Asia-Pacific Association for Computational Mechanics (APACM) Ohio University).
- 2015 *Non-classical molecular approaches of Nineteenth century: the first step towards discrete–to–non-local field models*. Invited talk at Congr Naz AIMETA, Genova 2015, September 15.
- 2016 *Statistically-based Homogenization Procedure for Random Composite Materials,* 7th International Conference on Computational Methods (ICCM2016), **Key-note presentation**, August 3, Berkeley (CA, USA). (Invitation by the Onorary Chairman G.R. Liu).
- 2016 *A Multiscale Description of Particle Composites: from Lattice Microstructures to Micropolar Continua* Multiscale Innovative Materials and Structures MIMS16, **Key-note presentation**, October 28, Cetara (SA), Italy (invitation by the Conference Chairs F. Fraternali, L. Feo).
- 2017 *Non-classical continuum modeling of materials with microstructure: a multiscale/multifield approach* - 8th International Conference on Computational Methods ICCM2017, (**Thematic Plenary Lecture**), July 27, Guilin, Guangxi, China. (Invitation by the Onorary Chairman G.R. Liu).
- 2017 *Multifield/Non-local Continuum Modelling of Materials with Microstructure: a Multiscale Approach,* Int. Symposium on Multiscale Computational Analysis of Complex Materials, **Key-note presentation**, August 30, 2017 Copenhagen, Denmark (invitation by

the Symposium Chair L. Mishnaevsky Jr.). • 2019 *Discrete to scale dependent (non-classical) continuous approaches for materials with microstructure: theoretical and computational issues*. (**General Lecture**), Multiscale Innovative Materials and Structures MIMS19, March 1, 2019 Cetara (SA), Italy • 2019 *Non-classical discrete-continuum descriptions for materials with internal structure: theoretical issues and computational results*, (**Lecture**), The 16th Int. Conf. on Civil, Structural & Environmental Engineering Computing (CIVIL-COMP2019), Riva del Garda (Italy), September 19. • 2019 *Scale-dependent continuum descriptions for materials with microstructure: old ideas and new formulations* (**Plenary Lecture**), Schrefler's Int. Symposium, Sustainable Industrial Processing Summit and Exhibition SIPS 2019, Cyprus, October 25.	
• 2000- Member of several Selection Boards (for RTDB, RTDA, Assistant Professors, Research Assistants, Ph.D's.; Nat./Intern. Scholarships etc. at: Sapienza, Univ. Politecnica Marche, Univ. Aquila, Univ. Pisa, Univ. Naples, Federico II). • 2009 Georgia National Science Foundation. Peer-reviewer. • 2013- Invited Remote Referee for the European Research Council (ERC Advanced Grant) • 2015- Invited Remote Referee for the European Research Council (ERC Advanced Grant) • 2016-17-18 Selection Committee for the awarding of scholarships for further training activities abroad (Sapienza) • 2017- Invited Remote Referee for the European Research Council (ERC Starting Grant) • 2017- Member of the Evaluation Committee for the AIMETA Junior Award • 2018 - ESF College of Expert Reviewers Member: http://www.esf.org/community-of-experts/ • 2019 – Member of the Assesment Committee for Professorship in Continuum Modelling at DTU Energy, Technical University Denmark	**Scientific Evaluation Committees/ Panels**
International (EU) Research Grants • 2010-2013 "Centre of Excellence for Modern Composites Applied in Aerospace and Surface Transportation", coordinated by T. Sadowski, Department of Solid Mechanics (Lublin University of Technology, Poland: EU grant No. FP7-245479). Participant. **MIUR-PRIN** National Government Grants • 2007 *Modellazione ed analisi, su base prestazionale, di strutture non lineari*, coordinated by R. Casciaro (University of Calabria, Italy). Participant. • 2012 *Models and algorithms for the nonlinear analysis of structures and the validation of performance-based design rules*, coordinated by R. Casciaro (University of Calabria). Coordinator of the Research Unit of Roma-Sapienza. • 2015 *Advanced mechanical modeling of new materials and structures for the solution of 2020 Horizon challenges*", coordinated by M. Di Paola (University of Palermo). Coordinator of the Research Unit of Roma-Sapienza. • 2017 ***Modelling of constitutive laws for traditional and innovative building materials***, coordinated by A. Carpinteri (University of Parma). Coordinator of the Research Unit of Roma-Sapienza. **MIUR-FIRB**, National Government Grants • 2007 New trends for multiscale-multifield analysis of composite materials. Phenomenological, theoretical and computational approaches, coordinated by M.L. De Bellis (Sapienza University of Rome). Grant application. (Project selected for the national competition). Participant. **MIUR National Government Grants**, Sapienza University of Rome • 2001 "Modelli costitutivi lineari e non-lineari per materiali da costruzione innovativi e tradizionali", coordinated by R. Masiani. Participant. • 2002-2003 "Architetture monumentali ed edifici in muratura. Modelli statici e modelli dinamici per la risposta sismica", coordinated by R. Masiani. Participant. • 2005-2006 "Analisi statica e dinamica del comportamento sismico delle costruzioni in muratura", coordinated by R. Masiani. Participant. • 2007-2008 "Analisi sismica delle costruzioni murarie esistenti: modelli per la valutazione del	**Funding ID EU** **MIUR Government grants** **Sapienza University grants**

comportamento statico e dinamico", coordinated by R. Masiani. Participant. • 2010 "Modelli multiscala-multicampo per lo studio di materiali compositi. applicazioni all'ingegneria e all'architettura'. Coordinator. • 2011 "Materiali compositi nell'ingegneria e nell'architettura: modelli costitutivi multiscala-multicampo per la descrizione della risposta strutturale statica e dinamica. Coordinator. • 2013 "Modelli meccanici avanzati per l'analisi di mezzi compositi: aspetti fenomenologici, teorici e computazionali". Coordinator. • 2013 Funding for Conferences: "On the 'Tectonics' in Architecture: between Aesthetics and Ethics (TAAE3), an International Symposium". Coordinator. • 2016 "New trends for multiscale/multifield analysis of 'complex' materials and structures. Advanced mechanical modeling and simulation". Coordinator. Ateneo Grandi Progetti • 2017 "New Trends for the Mechanical Modelling of Historical Masonry. An Interdisciplinary Approach". Coordinator. Ateneo Progetti Medi + Research Grant (Post-Doc position) • 2018 "**Advanced computational models for microstructured composite materials: from traditional to modern structural applications (ACM-MCM)**" - n. prot. RG1181642E3B3117 Coordinator. Ateneo Grandi Progetti + Research Grant (Post-Doc position) • 2018 "Wide-Range Laser Scanning Station for 3D Shape Reconstruction and Dynamic Measurements" - Grandi Attrezzature Scientifiche - Grandi Attrezzature. Participant • 2019 – Visiting Professor Grant (Prof. RRajarshi Das, School of Engineering, Royal Melbourne Institute of Technology, RMIT University). Proposing lecturer • MIUR National Government Grants, Federated University Humanities, Arts and Environment, Sapienza University of Rome 2007-2008 "Modelli meccanici per la muratura storica: aspetti costitutivi e sicurezza strutturale". Coordinator. 2009 "Modelli multiscala-multicampo per la descrizione meccanica di materiali "complessi": origini e sviluppi attuali". Coordinator. • MIUR National Government Grants, School of Architecture, Sapienza University of Rome 2000-2001 " Architetture storiche: modelli meccanici e sicurezza strutturale ". Coordinator. 2002-2003 "Fabbriche murarie d'interesse storico e monumentale: modelli per l'analisi e il progetto strutturale". Coordinator. 2004-2005-2006 "Modelli costitutivi con microstruttura per lo studio di materiali innovativi nell'architettura", Coordinator. • MURST, National Government Grants 1996-2000. National Government Grants, School of Architecture, 'Sapienza'University of Rome: other financed researches.	**Faculty grants**
• 2011- President of the Bachelor Degree Courses (Sapienza University of Rome, School of Architecture) in: - *Sciences of Architecture;* - *Architecture and Building Techniques;* - *Restoration and Conservation of Historical Architectures;* - *Interior Design and Furniture* • 1995-2005 Scientific Coordinator in charge of the Department Library, Department of Structural Engineering and Geotechnics, Sapienza University of Rome. • 2000-2006 Member of the Research Grant Committee, School of Architecture, Sapienza University of Rome. • 2003 Member of the Faculty Board of Governors, School of Architecture, Sapienza University of Rome. • 2000-2007 Member of the Department Board of Governors, Department of Structural Engineering and Geotechnics, Sapienza University of Rome. • 2005- Member of the Teaching Advisory Board Committee, School of Architecture, Sapienza University of Rome. • 2007-2009 Member of the Faculty Financial Resources Committee, School of Architecture, Sapienza University of Rome. • 2010-2011 Member of the Faculty Committee for the 'Development, Communication and	**Academic (Didactic) Institutional Appointments** **Service Appointments**

Coordination of Cultural Activities', School of Architecture, Sapienza University of Rome. • 2014- Member of the Executive Board of 'Centro di Ricerca Scienza e Tecnica per la Conservazione del Patrimonio Storico-Architettonico', Sapienza University of Rome. • 2015-2018 – Member of the Int Scientific Advisory (ISA) Committee of Int Conference on Computational Methods	
• **18** (Scopus) • 904 (Scopus)	**h-index** N. Tot Cits. Average Cits. 4 Most cited papers
• 1992 – present *Solid and Structural Mechanics*. • 2001-2004 *Statics*. • 2005 -2009 *Mechanics of Historical Masonry / Structural Masonry* • 2014-present *Degree Ateliers of Recycling* MSc Degree Courses in: Architecture UE; Architecture/Restoration and Bachelor Degrees in: Sciences of Architecture; Architecture and Building Techniques; Restoration and Conservation of Achitectural Heritage. School of Architecture, Sapienza	**Teaching**
• 2008-2013 *Historical Masonry as Complex Material: Micropolar Modelling of Periodic and Random Assemblies*. PhD Thesis in Structural Engineering, by A. Murrali, Sapienza University of Rome. The research featured the collaboration of Prof. M. Ostoja Starzewski and stochastical support of dr. S. Marcelli (Banca d'Italia); the thesis has been completed at the École des Mines (Prof. S. Forest) and École des Ponts (Prof. Karam Sab). • 2010-2015 *Comportamento di colonne in calcestruzzo consolidate o confinate con polimeri fibro-rinforzati soggette a carichi termici variabili*. PhD thesis in Structural Engineering, by M. Ramondetta , Sapienza(October 23, 2015). • 2015 *Advanced mechanical models for the analysis of composite media: phenomenological, theoretical and computational aspects*. A. Favata, annual Post-Doc Research Grant. Dep. of Structural and Geotechnical Engineering, Sapienza • 2015 *Implementation of Computational Models and Simulations for the Study of Materials with Microstructure*. E. Reccia, Post-Doc Research Grant, Dep. of Structural and Geotechnical Engineering, 'Sapienza'. • 2015 *Investigation of Thermo-Mechanical Properties of Fibre-Reinforced Porous Materials.* Post-Doc Scholarship, F. Sbardella, Dep. of Structural and Geotechnical Engineering, 'Sapienza'. • 2016 *Advanced mechanical models for the analysis of masonry: phenomenological, theoretical, computational aspects*, L. Leonetti, bi-annual Post-Doc Research Grant, Dep. of Structural and Geotechnical Engineering, 'Sapienza'. • 2016 *Advanced mechanical models for the analysis of composites,* two Post-Doc Scholarships, M. Pingaro, Dep. of Structural and Geotechnical Engineering, 'Sapienza'. • 2016-18 *Advanced mechanical models for the analysis of composite media: phenomenological, theoretical, computational aspects*. E. Reccia, bi-annual Post-Doc Research Grant, Dep. of Structural and Geotechnical Engineering, 'Sapienza'. • 2017-2020 *Advanced mechanical models for the analysis of composite media,* M. Pingaro, annual Post-Doc Research Grant, Dep. of Structural Engineering and Geotechnics, 'Sapienza'. • 2003 'Fabbriche murarie di interesse storico: modelli per l'analisi strutturale', MSc thesis in *Architecture* UE, S. Martorana, 2003 'L'uso di modelli matematici nella creazione di nuove forme per l'architettura', MSc Degree in *Architecture* UE, G. Ruggeri. • 2005 'Il calcolo a rottura per la muratura in *opus quadratum*: il caso del Ponte Loreto nella campagna lanuvina', MSc Degree in *Architecture-Restoration*, G. Caldarelli. • 2008 "Strutturisti-Costruttori, Strutturisti-Matematici, Architetti-Strutturisti. Il ruolo della matematica nell'invenzione di architetture resistenti per forma", MSc Degree in *Architecture-Restoration*, I. Pallai. • 2008 'Strutturisti-Costruttori, Strutturisti-Matematici, Architetti-Strutturisti. L'evoluzione della 'concezione strutturale' nella progettazione delle cupole nell'età moderna', MSc Degree	**Phd Thesis/ Research Assistants** supervision **Honour MSc-BSc Thesis** supervision (selected) School of Architecture, 'Sapienza'

in *Architecture-Restoration*, A. Ulivi. • 2010 'Il castello Eurialo a Siracusa: un approccio interdisciplinare per la conservazione e la valorizzazione', MSc Degree in *Architecture-Restoration*, M. Ramondetta. • 2012 'I dissesti strutturali delle Mura Aureliane: un approccio interdisciplinare per la conservazione', Bachelor Degree in *Restoration and Conservation of Historical Architectures*, by M. Doria. • 2013 'Matematica e Architettura. Ottimizzazione strutturale e invenzione della forma', Bachelor Degree in *Architecture and Building Techniques*, F. Pilla. • 2013 'Studio meccanico di archi in muratura. Il caso dei cuniculi di Claudio nel bacino del lago Fucino', Bachelor Degree in *Sciences of Architecture*, S. Iarussi. • 2014 'Modelli Matematici in Architettura. Origini e Sviluppi Attuali'. Bachelor Degree in *Sciences of Architecture*, S. Vadidar. • 2017 'Ottimizzazione Strutturale e Progetto di Forma', Master of Science in Architecture, A. Tinelli. • 2019 'Il Ninfeo di Gennazano: analisi della fabbrica muraria e dei dissesti strutturali', Bachelor Degree in in *Sciences of Architecture*, D. Giubilei • 2014-19 More than 50 thesis from the degree Atelier on *Aecological Island and Recycling Centres* in collaboration with AMA'Roma (Environment Municipal Company of Rome), arch. R, Panei and AMA Heritage office. School of Architecture, 'Sapienza'.	

28 January 2020

Patrizia Trovalusci