

Marco Pingaro

Curriculum Vitæ

(last update: September 29, 2019)

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1 Personal data

- Place of birth:
- Date of birth:
- Sex:
- Nationality:
- Country of residence:
- Civil status:
- Home address:
- Current address:
- Current work activity: Post PhD fellowship at Department of Structural And Geotechnical Engineering, University of "La Sapienza", Rome.

2 Contacts

- Address: Department of Structural Engineering and Geotechnics, University of Rome "La Sapienza", Via Gramsci 53, 00197 Rome (Italy)
- Phone (office):
- Mobile:
- Fax:
- E-mail:
- Web-page:

3 Studies and career

Academic position:

- *December 2017 - November 2019*: **research fellow** at Department of Structural and Geotechnical Engineering, Sapienza University of Rome, Rome, Italy.
Project: "Advanced mechanical models for the analysis of composite media: phenomenological, theoretical, computational aspects".
Supervisor: Prof.ssa Patrizia Trovalusci.

Graduate studies:

- *March 2012 - June 2012*: **holder of scholarship** at Department of Structural and Geotechnical Engineering, Sapienza University of Rome, Rome, Italy.
- *February 2013*: **italian engineering professional license** in Civil engineering with valuation 250/260:
 - written test (subjects typical of the area) : 60/60;
 - written test (subjects typical graduating class) : 60/60;
 - oral examination : 50/60;
 - practice test (project) : 60/60.
- *Dicember 2015 - January 2021*: Coordinatore per la Sicurezza nei Cantieri in fase di Progettazione ed Esecuzione, Pavia.
- *November 2015 - February 2016*: **holder of scholarship** at Department of Civil Engineering and Architecture, University of Pavia, Pavia. Scholarship title: "*Isogeometric solid shell elements*"
- *April 2016 - July 2016*: **holder of scholarship** at Department of Civil Engineering and Architecture, University of Pavia, Pavia. Scholarship title: "*Application of the Virtual Elements Method in Topology Optimization*"
- *November 2012 - May 2016*: **Doctor of Philosophy (PhD)** in *Computational Mechanics and Advanced Materials* at IUSS (Pavia), PhD Thesis: *Isogeometric methods for structural applications*. Supervisor: Prof. A. Reali, Prof. Josef Kiendl, Dr. Pablo Antolin.

- *December 2016 - November 2017: holder of scholarship* at Department of Structural and Geotechnical Engineering, Sapienza University of Rome, Rome, Italy. Scholarship title: "*Advanced mechanical models for the analysis of composites*".
Supervisor: Prof.ssa Patrizia Trovalusci.
- *December 2017 - November 2019: researcher fellow* at Department of Structural And Geotechnical Engineering, Sapienza University of Rome, Rome, Italy.
Project: "Advanced mechanical models for the analysis of composite media: phenomenological, theoretical, computational aspects".
Supervisor: Prof.ssa Patrizia Trovalusci.

Undergraduate studies:

- *September 2009 - December 2011: Master Degree* in Civil Engineering at the University of Pavia with the grade of **110/110 cum Laude**. Thesis: *Formulazione innovativa agli elementi finiti misti per strutture visco-elastiche*. Advisor: Prof. P. Venini.
- *September 2005 - July 2009: Bachelor Degree* in Civil Engineering at the University of Pavia with the grade of **110/110**. Thesis: *Implementation of a Mixed Finite element PEERS for plane elasticity with lagrangian multipliers technique*. Advisor: Prof. P. Venini.
- *September 2000 - July 2005: Diploma di Maturità Tecnico Professionale* (High School Degree) at the Institute "A. Volta" in Pavia (PV), Italy, with the grade of **100/100**.

Awards:

- *November 2012*: Winner of the PhD scholarship "**Isogeometric method for structural and biomedical applications**", grant by the Department of Civil Engineering and Architecture funding through the 2010 ERC Starting Grant FP7 "Ideas" Programme, European Research Council.

Local staff at congress:

- **Member** of the local organizing committee of the conference ICCM 2018 (Roma).
- **Organizer** of the Minisimposium *MS-060 Polygonal, Polyhedral and Virtual Element for advanced applications* within the conference ICCM 2018 (Roma).

4 Research and publications

Main research topics:

- Analysis with mixed finite elements (Truly Mixed)**. Implementation of finite element codes using the *Hellinger-Reissner* formulation for the solution challenging of structural problems (**PEERS element** and **Arnold-Winther element**, etc.):in plane elasticity, viscoelasticity, and plasticity.
- Second gradient problems and application**. Characterized materials with internal length scale: porous materials, composites or fractured media.
- Isogeometric analysis**. Numerical analysis technique that exploits the definition of exact geometry of the domain and high regularity. Thanks to these characteristics is used for the solution of fourth order problems such as plates and shells.
- Project GeoPDEs**. Implementation of parts of the code in the program for the isogeometric analysis **GeoPDEs**. In particular, the part relating to the problems of fourth order (see <http://rafavzqz.github.io/geopdes/contributors/>).
- Topology Optimization**. Study and Implementation of codes for topology optimization using mixed finite elements.

- f. **VEM elements.** Study and implementation of codes using Virtual Element Method applied to topology optimization and homogenization of random composite materials. In this project we implement a program in Python (PyVEM) for 2-D linear elasticity (isotropic and orthotropic) and enriched continuum such as Cosserat continuum.
- g. **Random materials.** Study random materials made of matrix and inclusions (particles); examples of such materials are polymer, ceramic, metal matrix composites, but also granular materials, concrete, masonry made of crushed stones casually arranged in the mortar and even porous rocks.

Scientific/scholarly publications:

- 5 Journal articles (accepted)
- 2 International conference Proceedings
- 5 Communications to International Conferences
- 7 Communications to National Conferences

Journal articles:

1. P. Venini, **M. Pingaro**. *A fast approach to analysis and optimization of viscoelastic beams*. Computers and Structures, **168** pp. 46-55, 2016. DOI: [10.1016/j.compstruc.2016.02.010](https://doi.org/10.1016/j.compstruc.2016.02.010)
2. P. Venini, **M. Pingaro**. *A new approach to optimization of viscoelastic beams: minimization of the input/output transfer function \mathbf{H}_∞ -norm*. Structural and Multidisciplinary Optimization, **55**(5) pp. 1559-1573, 2017. DOI: [10.1007/s00158-016-1600-5](https://doi.org/10.1007/s00158-016-1600-5)
3. P. Venini, **M. Pingaro**. *An innovative \mathbf{H}_∞ -norm based worst case scenario approach for dynamic compliance optimization with applications to viscoelastic beams*. Structural and Multidisciplinary Optimization, **55**(5) pp. 1685-1710, 2017. DOI: [10.1007/s00158-016-1605-0](https://doi.org/10.1007/s00158-016-1605-0)
4. **M. Pingaro**, E. Reccia, P. Trovalusci, R. Masiani. *Fast Statistical Homogenization Procedure (FSHP) for particle random composite using Virtual Element Method*. Computational Mechanics, **64**(1) pp. 197-210, 2019. DOI: [10.1007/s00466-018-1665-7](https://doi.org/10.1007/s00466-018-1665-7)
5. **M. Pingaro**, E. Reccia, P. Trovalusci. *Homogenization of Random Porous Materials With Low-Order Virtual Elements*. ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part B: Mechanical Engineering, **5**(3), 2019. DOI: [10.1115/1.4043475](https://doi.org/10.1115/1.4043475)

Journal articles (submitted):

1. **M. Pingaro**, G. Maurelli, P. Venini. *Analysis and damage identification of a moderately thick cracked beam using an interdependent locking-free element*. Submitted to Journal of Optimization Theory and Applications

International conference Proceedings:

1. P. Venini, **M. Pingaro**, C. Cinquini, *Designing manufacturable viscoelastic devices using a topology optimization approach within a truly-mixed fem framework*, (2016) ECCOMAS Congress 2016 - Proceedings of the 7th European Congress on Computational Methods in Applied Sciences and Engineering, 2, pp. 3724-3738, 2016. DOI: [10.7712/100016.2068.8473](https://doi.org/10.7712/100016.2068.8473)
2. **M. Pingaro**, E. Reccia, P. Trovalusci, M. L. De Bellis, *Statistical Homogenization of Random Porous Media*, (2019) UNCECOMP 3rd ECCOMAS Thematic Conference on Uncertainty Quantification in Computational Sciences and Engineering (accepted).

Communications to International Conferences:

1. Carlo Cinquini, Matteo Bruggi, **Marco Pingaro**, Paolo Venini *An optimal displacement-recovery approach for truly-mixed elastic and viscoelastic 2D continua*. Sommario Euromech 2011.
2. F. Auricchio, **M. Pingaro** (presenting author), A.Reali, G. Sciarra, P.Venini, S. Vidoli *Isogeometric analysis for anti-plane fracture problems*. Second ECCOMAS Young Investigators Conference 2013.
3. P. Trovalusci, **M. Pingaro**, M.L. De Bellis (presenting author), E. Reccia. *A Fast Statistical Homogenization Procedure (FSHP) for random composite*. XIII Congress - World Congress in Computational Mechanics - WCCM 2018 New York, 22-27 Luglio 2018.
4. **M. Pingaro** (presenting author), E. Reccia, P. Trovalusci. *Fast Statistical Homogenization Procedure (FSHP) for Particle Random Composite*. 9th International Conference on Computational Methods - ICCM 2018 Roma, 06-10 August 2018.
5. **M. Pingaro** (presenting author), M. L. De Bellis, P. Trovalusci. *Virtual Element Method In Plane Cosserat Elasticity*. International Conference on Nonlinear Solid Mechanics - ICoNSoM 2019 Roma, 16-19 June 2019.

Communications to National Conferences:

1. M. Bruggi, **M. Pingaro**, P. Venini. *A mixed approach to viscoelasticity using the Arnold-Winther finite element*. XVIII Convegno Italiano di Meccanica Computazionale - GIMC 2010, Siracusa, 21-24 settembre 2010.
2. Paolo Calvi, **Marco Pingaro**, Paolo Venini. *Truly-mixed finite elements for the analysis of viscoelastic devices*. AIMETA 2011: XX Congresso - Associazione Italiana di Meccanica Teorica e Applicata, Bologna, 12-15 Settembre 2011.
3. P. Venini, **M. Pingaro** (presenting author), C. Cincini. *An energy-based approach to topology optimization using the Hu-Washizu variational principle*. AIMETA 2015: XXII Congresso - Associazione Italiana di Meccanica Teorica e Applicata, Genova, 14-17 Settembre 2015.
4. P. Venini, **M. Pingaro** (presenting author). *A new paradigm for dynamics topology optimization: shaping the transfer function H_{inf} norm*. AIMETA 2015: XXII Congresso - Associazione Italiana di Meccanica Teorica e Applicata, Genova, 14-17 Settembre 2015.
5. **M. Pingaro** (presenting author), P. Trovalusci, E. Reccia. *Integrated Procedure for Homogenization of Particle Random Composites Using Virtual Element Method*. AIMETA 2017: XXIII Congresso - Associazione Italiana di Meccanica Teorica e Applicata, Salerno, 04-07 Settembre 2017.
6. **M. Pingaro** (presenting author), E. Reccia, P. Trovalusci, R. Masiani. *Homogenization of particle random composite: a Fast Statistical Procedure (FSHP) using Virtual Element Method*. Workshop on Recent Advances in Mechanics, Dynamics and Probability theory WMDP 2018 Palermo, 05-06 Marzo 2018.
7. **M. Pingaro** (presenting author), M. L. De Bellis, P. Trovalusci. *An Efficient Virtual Element Method (VEM) Approach for Bimaterial Systems*. XXII Convegno Italiano di Meccanica Computazionale e IX Riunione del Gruppo Materiali AIMETA - GIMC GMA 2018 Ferrara, 13-14 Settembre 2018.

5 Post-lauream courses

- 20-24 May 2013: *Iso-Geometric Methods for Numerical Simulation*. Speakers: Yuri Bazilevs (University of California, San Diego, La Jolla,

CA, USA), Gernot Beer (Technical Univ. of Graz, Graz, Austria), Stéphane P.A. Bordas (Cardiff University, Cardiff, Great Britain), Bert Juettler (Johannes Kepler University, Linz, Austria), Alessandro Reali (University of Pavia, Pavia, Italy), Michael A. Scott (Brigham Young University, Provo UT, USA). **International Centre for Mechanical Sciences. Udine (Italy).**

- *8-12 April 2013: Corso Isogeometric Analysis* Speakers Alessandro Reali (University of Pavia, Pavia, Italy), Rafael Vázquez (IMATI 'Enrico Magenes', Pavia, Italy). **Department of Civil Engineering and Architecture, Pavia (Italy).**
- *19-21 February 2013: Elements of Spline Theory* Speakers: Tom Lyche (Professor of Computer Science, University of Oslo, Norvegia). **IMATI CNR "Enrico Magenes", Pavia (Italy).**
- *19-23 January 2015: MUMOLADE: Multiscale Modelling Of Landslides and Debris Flows* Speakers: D. Gawin (Lodz University of Technology, Poland), L. Savania (University of Padova, Italy), B. Schrefler (University of Padova, Italy), R. Genevois (University of Padova, Italy), M. Ferronato (University of Padova, Italy), M. Putti (University of Padova, Italy), A. Reali (University of Pavia, Italy). **University of Padova, Padova (Italy).**
- *18-20 February 2015: Python Programming for Machine Learning* Speakers: Blaž Zupan, Marinka Žitnik (University of Ljubljana). **Dottorato di Ricerca in bioingegneria e bioinformatica, University of Pavia, Pavia (Italy).**

6 Academic activities

- *October 2018 - July 2019: Teaching assistant (Tutor) in Scienza delle costruzioni*, 3rd year course, Bachelor Degree in Architecture
- *October 2016 - July 2017: Teaching assistant (Tutor) in Fisica*, 1st year course, Bachelor Degree in Civil Engineering
- *October 2016 - July 2017: Teaching assistant (Tutor) in Scienza delle costruzioni*, 2nd year course, Bachelor Degree in Civil Engineering
- *October 2012 - July 2013: Teaching assistant (Tutor) in Scienza delle costruzioni*, 3rd year course, Master Degree in Construction Engineering and Architecture
- *October 2011 - July 2012: Teaching assistant (Tutor) in Scienza delle costruzioni*, 3rd year course, Master Degree in Construction Engineering and Architecture **Teaching assistant (Tutor) in Scienza delle costruzioni C**, 3rd year course, Bachelor Degree in Civil Engineering
- *March 2011 - July 2011: Teacher in Structural Engineering*, 4th year course, Master Degree in Construction Engineering and Architecture (Chinese curriculum)
- *March - July 2011 : Teaching assistant (Tutor) in Meccanica C*, 3rd year course, Bachelor Degree in Mechanics Engineering
- *October 2010- July 2011: Teaching assistant (Tutor) in Scienza delle Costruzioni*, 3rd year course, Master Degree in Construction Engineering and Architecture
- *March - July 2010 : Teaching assistant (Tutor) in Meccanica C*, 3rd year course, Bachelor Degree in Mechanics Engineering
- *October 2009 - February 2010: Teaching assistant (Tutor) in Teoria delle Strutture*, 3rd year course, Bachelor Degree in Civil Engineering
- Co-supervisor of the many thesis at University of Pavia and "La Sapienza" University of Roma

7 Professional consulting and collaborations

- *November 2012 - December 2013: Analysis (static and dynamics) and structural assessment for systems of transformers on behalf of "Tamini Trasformatori s.r.l." (Legnano, MI).*

Work with Ing. Giacomo Maurelli and Prof. Ing. Paolo Venini.

- *December 2016 - currently*: Code Development and Programming in Python: Consultant for "Studio Calvi s.r.l." (Pavia, PV).

8 Languages and computer knowledge

Languages:

- Italian (mother language).
- English (oral: good, written: good).

Computer knowledge:

- *Operative systems*: Linux (ArchLinux), MacOS, Windows.
- *Programming languages*: MATLAB/Octave, C/C++, Python.
- *Programs*: L^AT_EX, MS Office, AutoDesk Autocad, Finite Element Programs (SAP2000, STRAUS7, PROSAP, etc.), Fenics.