

CURRICULUM OF THE SCIENTIFIC AND TEACHING ACTIVITY OF LORENZA PETRINI

General information

Contacts

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STUDIES AND CAREER

Academic position

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| October 2018 – presently | Eligible for full professor position of Solid Mechanics (ICAR/08) |
| March 2013 – presently | Associate Professor (ART.18 L. 240/10) of Solid Mechanics (ICAR/08), Department of Civil and Environmental Engineering, Politecnico di Milano. |
| December 2008 – February 2013 | Tenured Assistant Professor of Mechanics of Solids (sector ICAR/08 - Scienza delle Costruzioni) at the Department of Civil and Environmental Engineering, Politecnico di Milano, School of Civil Architecture. |
| July 2005 – November 2008 | Assistant Professor of Mechanics of Solids (sector ICAR/08 - Scienza delle Costruzioni) at the Department of Structural Engineering, Politecnico di Milano, School of Civil Architecture. |

Postdoc and research contracts

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| September 2003 – June 2005 | Researcher with open-ended contract at the European Centre for Training and Research in Earthquake Engineering (EUCENTRE, Pavia). |
| July 2000 – August 2003 | Postdoctoral fellow at the Department of Structural Mechanics of the Università degli Studi di Pavia. Research title: “Biomedical applications of Shape Memory Alloys”. Advisor Prof. F. Auricchio. |

Graduate and undergraduate degrees

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| April 2000 | Philosophiæ Doctor in Civil Engineering with the thesis: “Shape Memory Alloys: modeling the martensitic phase for structural engineering exploitation”. Advisor Prof. F. Casciati (Università degli Studi di Pavia). |
| November 1996 | Italian engineering professional license, obtained with the grade of 95/100 |
| June 1996 | Laurea in Civil Engineering (MSc, Structural Design) at Politecnico di Milano with the grade of 110/110 summa cum laude. Laurea thesis: “Analisi probabilistica di strutture non lineari con il metodo della linearizzazione equivalente (Probabilistic analysis of non linear structures with the equivalent linearization method)”. Advisor Prof. A. Castiglioni |
| July 1989 | Diploma di Maturità Classica (High School Degree) at Liceo-Gymnasium "G.Parini" in Milan with the grade of 60/60. |

TEACHING ACTIVITY

Graduate level Courses

2016, 2018.	Lesson in the course “Experimental biomechanics“, PhD in Bioengineering of Politecnico di Milano.
2017	Seminar on “Modeling functional fatigue and plasticity of Shape Memory Alloys: applications in the biomedical field” organized by Scientific Commission of the Department of Civil and Environmental Engineering and offered to PhD students of Politecnico di Milano
2013	Lesson in the transversal course on Safety and Environment of the Scuola Interpolitecnica di Dottorato Torino – Milano – Bari: “Seismic risk: definition, measure and mitigation”
2009, 2011, 2013	PhD course at the School of Doctoral Programs of Politecnico di Milano: “Nonlinear computational mechanics for biological tissue and materials for biomedical applications”, in English (Main lecturer).
2006	PhD course at the Department of Structural Engineering of Politecnico di Milano: “Seismic Engineering”, in English (Main lecturer).
2003, 2006	Course for the MSc in Surgery Engineering at Politecnico di Milano: “Design of tools and devices for the cardiac and vascular surgery” (Main lecturer).
2003	MSc - PhD course at the European School for Advanced Studies in Reduction of Seismic Risk (ROSE School, Pavia): “Linear and nonlinear finite element analysis”, in English (teaching assistant, main lecturers Prof. F. Auricchio and Prof T. Hughes).
2002	Course for the MSc in Material Science at Università degli Studi Pavia: “Engineering of materials” (Main lecturer).
2001	MSc - PhD course at the European School for Advanced Studies in Reduction of Seismic Risk (ROSE School, Pavia): “Material mechanics in earthquake engineering”, in English (teaching assistant, main lecturer Prof. F. Auricchio)
2001	MSc - PhD course at the European School for Advanced Studies in Reduction of Seismic Risk (ROSE School, Pavia): “Dynamic Analysis of Structures” in English (teaching assistant, main lecturer Prof. G. Fenves).

Undergraduate level courses

2016 – 2019	Course of “Scienza delle costruzioni” (Mechanics of Solid), Bachelor Degree Course in Architectural Design, School of Architecture Urban Planning and Construction Engineering at Politecnico di Milano (institutional duty).
2016/17 – 2018/19	Integrated laboratory of “Architettura per la conservazione delle costruzioni complesse: Affidabilità e Vulnerabilità” (Architectural design studio for restoration of complex architecture: Reliability and vulnerability), Master Degree Course in Architecture of Construction, School of Architecture Urban Planning and Construction Engineering at Politecnico di Milano (institutional duty).
2015/16 – 2017/18	Integrated laboratory of “Architettura delle costruzioni complesse: Strutture” (Architectural design studio for complex architecture 1: Structures), Master Degree Course in Architecture of Construction, School of Architecture Urban Planning and Construction Engineering at Politecnico di Milano (institutional duty).
2015 – 2016	Integrated laboratory of “Progettazione Architettonica 2: Strutture (Architectural Design 2: Structures)”, Bachelor Degree Course in Architecture, School of

- Architecture Urban Planning and Construction Engineering at Politecnico di Milano (institutional duty).
- 2015 – 2016 Integrated laboratory of “Progettazione per il costruito 1: Teoria e Progetto di Costruzioni e Strutture (Architectural Design for existing structures 1: Theory and Design of Constructions and Structures)”, Master Degree Course in Architecture of Construction, School of Civil Architecture at Politecnico di Milano (institutional duty).
- 2014 – 2015 Integrated laboratory of “Progettazione per il costruito 2: Teoria e progetto di costruzioni e Strutture” (Architectural Design for existing structures 2: Theory and Design of Constructions and Structures), Master Degree Course in Architecture of Construction, School of Civil Architecture at Politecnico di Milano (institutional duty).
- 2014 – 2016 Course of “Mechanics of Solid”, Master Degree Course in Architecture of Construction, School of Civil Architecture at Politecnico di Milano (institutional duty).
- 2006 – 2016 Course of “Meccanica delle Strutture (Structural Mechanics)”, Bachelor Degree Course in Science of Architecture, School of Civil Architecture at Politecnico di Milano (institutional duty).
- 2011 – 2014 Integrated laboratory of “Progettazione Architettonica 1: Fondamenti di Statica nell’Architettura (Architectural Design 1: Principles of Statics in Architecture)”, Bachelor Degree Course in Architecture of Construction, School of Civil Architecture at Politecnico di Milano (institutional duty).
- 2012 – 2014 Course of “Structural Mechanics”, Master Degree Course in Materials Engineering and Nanotechnology, School of Industrial Processes Engineering, in English (institutional duty).
- 2013 – 2014 Integrated laboratory of “Progettazione per il costruito 1: Teoria e Progetto di Costruzioni e Strutture (Architectural Design for existing structures 1: Theory and Design of Constructions and Structures)”, Master Degree Course in Architecture of Construction, School of Civil Architecture at Politecnico di Milano (institutional duty).
- 2009 – 2011 Integrated laboratory of “Progettazione Architettonica 1: Fondamenti di Statica nell’Architettura (Architectural Design 1: Principles of Statics in Architecture)”, Bachelor Degree Course in Science of Architecture, Faculty of Civil Architecture at Politecnico di Milano (institutional duty).
- 2008 – 2009 Integrated laboratory of “Progettazione Architettonica 1: Teoria e Progetto di Costruzioni e Strutture (Architectural Design 1: Theory and Project of Constructions and Structures)”, Master Degree Course in Architecture, Faculty of Civil Architecture at Politecnico di Milano (institutional duty).
- 2006 – 2008 Course of “Meccanica Computazionale (Computational mechanics)”, Master Degree Course in Architecture and Architecture of Construction, Faculty of Civil Architecture at Politecnico di Milano (institutional duty).
- 2006 – 2007 Course of “Meccanica dei Continui e delle Strutture (Continuum and Structural Mechanics)”, Bachelor Degree Course in Biomedical Engineering, Faculty of Industrial Processes Engineering at Politecnico di Milano (teaching assistant, main lecturer Prof. P. Vena).
- 2005 – 2006 Course of “Analisi Strutturale e Calcolo Automatico delle Strutture (Structural and Numerical Analysis of Structures)”, Master Degree Course in Architecture and Architecture of Construction, Faculty of Civil Architecture at Politecnico di Milano (institutional duty).
- 2004 – 2005 Course of “Progetto di Strutture in Zona Sismica (Structural Design in Seismic Zones)”, Master Degree Course in Civil Engineering, Faculty of Engineering, at Università degli Studi di Pavia (teaching assistant, main lecturer Prof. G.M. Calvi).

2003 – 2004	Course of “Tecnica delle Costruzioni B (Technique of Construction B)”, Bachelor Degree Course in Civil Engineering, Faculty of Engineering, at Università degli Studi di Pavia (teaching assistant, main lecturer Prof. G.M. Calvi).
2003 – 2004	Integrated laboratory of “Progettazione Architettonica 3: Teoria e Progetto di Costruzioni e Strutture (Architectural Design 3: Theory and Project of Constructions and Structures)”, Bachelor Degree Course in Architecture of Construction, Faculty of Civil Architecture at Politecnico di Milano (teaching assistant, main lecturer Prof. E. Garavaglia).
2003 – 2004	Course of “Progetto di Strutture (Structural Design)”, Master Degree Course in Civil Engineering, Faculty of Engineering at Università degli Studi di Pavia (teaching assistant, main lecturer Prof. G.M. Calvi).
2002 – 2003	Course of “Biomeccanica (Biomechanics)”, Bachelor Degree Course in Physical Education, Faculty of Medicine and Surgery at Università degli Studi di Pavia (adjunct professor)
2001 – 2003	Course of “Biomeccanica (Biomechanics)”, Bachelor Degree Course in Biomedical Engineering, Faculty of Engineering at Università degli Studi di Pavia (teaching assistant, main lecturer Prof. F. Auricchio).
2000 – 2003	Course of “Scienza delle Costruzioni I (Continuum mechanics I)”, Bachelor Degree Course in Electrical Engineering, Faculty of Engineering at Università degli Studi di Pavia (teaching assistant, main lecturer Prof. F. Auricchio).
1996 – 2000	Course of “Scienza delle Costruzioni I (Continuum mechanics I)”, Bachelor Degree Course in Civil Engineering, Faculty of Engineering at Università degli Studi di Pavia (teaching assistant, main lecturer Prof. F. Casciati).
1996 – 2000	Course of “Teoria delle Strutture (Theory of Structures)”, Bachelor Degree Course in Infrastructural Engineering, Faculty of Engineering at Università degli Studi di Pavia (teaching assistant, main lecturer Prof. L. Faravelli).

Courses and Seminars to Professional Engineers

2017	Lesson on Theory and Standard in the course “Linear and nonlinear analyses for the assessment of R.C. existing buildings: modeling and verification based on force and displacement approach” organized by Associazione Tecnologi per l'Edilizia (ATE).
2016	Lesson on Linear and nonlinear methodology for seismic assessment of R.C. structure according to NTC 2008 in the course “Approach for seismic assessment: analysis method and practical experiences” organized by Associazione Tecnologi per l'Edilizia (ATE).
2013	Course for professional engineers on the Non Linear Time History Analyses for Seismic Assessment of R.C. structures istenti” for the Engineer Association of Imperia.
2012	Seminars on Direct Displacement-based Assessment of Bridges for the Engineer Associations of Varese and Cuneo.
2012	Course for professional engineers on the Non Linear Time History Analyses for Seismic Assessment organized by Harpaceas company (Milano).
2010, 2011	Seminars on Non linear Methodologies for Design and Assessment of Buildings According to the New Italian Code DM. 2008 for the Engineer Associations of Bergamo, La Spezia, Genova, Imperia.
2009	Short course in Seismic Design of R.C. Buildings organized by the European Centre for Training and Research in Earthquake Engineering (EUCENTRE, Pavia).
2009	Seminars on the Seismic Design of Buildings According to the Italian Code DM. 2008 for professional engineers of Milano, Padova, Roma and Firenze.

2009	Workshop on Shape Memory Alloys: Materials and Novel Applications organized by the Italian Metallurgy Association.
2008, 2009	Seminars on the Seismic Assessment of Buildings According to the New Italian Code DM. 2008 for the Engineer Associations of Lecco, Milano, Savona, Pavia, Torino, Genova, Imperia, Verbania.
2007	Permanent training course on the Time-dependent Problems in Geotechnical Engineering held at Politecnico di Milano.
2006	Seminars on the New Italian Code (DM. 2005) for the Engineer Associations of Loano, Novara, Lecco.
2006	Seminars on the Seismic Design of Buildings According to the Italian Code DM. 2005 for professional engineers of Milano, Padova, Roma and Firenze
2005, 2006	Short courses in Evaluation and Assessment of R.C. Buildings organized by the European Centre for Training and Research in Earthquake Engineering (EUCENTRE, Pavia).
2005	Training course in Non Linear Analysis of R.C. Structures organized by EUCENTRE for the employees of the Department of Civil Protection.
2005	Course on the Italian Seismic Code OPCM 3274" organized by the Architect Association of Lucca.
2005	Training course on Seismic Risk and Civil Protection Organization for School Administrators of the provinces of Bergamo, Brescia, Cremona and Pavia.
2005	Training course on the Seismic Behaviour of R.C. and Masonry Structures and Infrastructures organized by I.Re.F. for municipal, provincial and regional technicians of the Regione Lombardia.
2004, 2006	Short courses in Non Linear Analysis of R.C. Structures organized by the European Centre for Training and Research in Earthquake Engineering (EUCENTRE, Pavia).
2004, 2005	Refresher courses in Seismic Design of R.C. and Masonry Buildings organized by the Engineer Association of Pavia, the Engineer and Architect Association of Biella, Santhià and Vercelli, the Architect Association of Aosta.
2004	Training course in Planning and Management of the Seismic Emergency organized by the Board of Surveyors of Brescia.
2004	Training course in Emergency Management organized by I.Re.F. for public employees of the Regione Lombardia.
2003	Course on Material Mechanics at the Scientific-Technological and Telecommunication Park in Valle Scrivia (Voghera, Italy).

Invited Seminar for Company

2014	Seminar on "Developments in biodegradable stents" at SAES Getters, Lainate, Milan.
2011	Seminar on the Modeling of Nitinol Biomedical Devices organized by CNR-IENI of Lecco for engineers of the CID-Vascular company (Saluggia, VC).

Educational Seminars

2007 – 2019	Educational seminars on the Virtual Work Principle in the frame of the course Biomeccanica I (Biomechanics I), Bachelor Degree Course in Biomedical Engineering, School of Industrial Processes Engineering at Politecnico di Milano
2008 – 2018	Educational seminars on the Thermo-mechanical Behaviour of Shape Memory Alloys in the frame of the course Costruzioni Biomeccaniche (Biomedical Constructions), Master Degree Course in Biomedical Engineering, School of Industrial Processes Engineering at Politecnico di Milano

2000 – 2003 Educational seminars on the Finite Element Method in the frame of the course Scienza delle Costruzioni II (Continuum mechanics II), Master Degree Course in Civil Engineering, Faculty of Engineering at Università degli Studi di Pavia.

Teaching activities held for national and international institutions:

- Lessons in the frame of the project “Centro di formazione professionale per il restauro e la conservazione del patrimonio culturale”, Quang Nam Province - Vietnam, founded by Italian Agency for Cooperation to development; partner People’s Committee of Quang Nam Province, Vocational Training College in Quang Nam Province, 2017-2019.
- Lesson at the PhD School “Medical Device Design” in the frame of European Project VPH-CaSE TA2, 2016
- Lesson in the Study Day “Leghe a memoria di forma: Materiali per l’innovazione di prodotti biomedicali e industriali” organized by Centro di Studio Metallurgia Fisica e Scienza dei Materiali della Associazione Italiana di Metallurgia, 2016.
- Lesson at the PhD Summer School “Medical Device Design” in the frame of “MeDDiCA” Marie Curie ITN European Project, 2011.
- Lesson in the Study Day “Leghe a memoria di forma: materiali, applicazioni attuali e future” organized by Centro di Studio Metallurgia Fisica e Scienza dei Materiali e Metalli e Tecnologie Applicative della Associazione Italiana di Metallurgia, 2009.

ADVISOR OF THESIS

Lorenza Petrini has been advisor and co-advisor of many theses at the undergraduate and graduate level in the field of Structural Engineering and Biomechanics.

In particular, for the Master of Science in Earthquake Engineering at the European School for Advanced Studies in Reduction of Seismic Risk (ROSE School, Pavia) she has been advisor or co-advisor of the following master theses:

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| 2012 | “Non-linear Dynamic Soil-structure Interaction for Displacement-based Seismic Assessment of Bridges”. Author: Pengpeng Ni. |
| 2011 | “Improvements in Direct-Displacement Base Assessment procedure for bridges”
Author: Murathan Paksoy. |
| 2010 | “Study of the effect of higher modes on DDBD procedure applied to continuous concrete bridges under transverse seismic excitation”. Author: María José Rodríguez. |
| 2008 | “Direct Displacement Based Design of continuous concrete bridges with soil-structure interaction”. Author: Ricardo Alejandro Zapata Montoya. |
| 2008 | “Evaluation of the regulations used in Colombia for the seismic vulnerability assessment of existing concrete structures”. Author: Jaime H González. |
| 2007 | “Comparison of assessment approaches to different typologies of RC structures”.
Author: Davide Spano’ |
| 2007 | “Direct Displacement Based Design: long span bridges with/without in-plane movement joint”. Author: Gopal Adhikari. |
| 2007 | A critical review of the R.C. existing building assessment procedure according to Eurocode 8 and Italian Seismic Code”. Author: Vassilis Mpampatsikos. |
| 2006 | Analysis of code procedures for seismic assessment of existing buildings: Italian Seismic Code, EC8, ATC-40, FEMA356, FEMA440”. Author: Boyan Mihaylov. |
| 2003 | Shape-Memory Alloy Devices in Earthquake Engineering: Mechanical Properties, Constitutive Modelling and Numerical Simulations”. Author: Davide Fugazza. |

She has been also advisor or co-advisor of the following PhD thesis:

- "Nickel-Titanium Alloys for biomedical applications: improvements in modelling". Author: Francesca Berti. PhD in Materials Engineering (Politecnico di Milano), XXXII cycle
- "How does NiTi alloy production influence cardiovascular device performance?" Autore Carlo Guala. PhD in Bioengineering (Politecnico di Milano), XXXI cycle
- "Effects of spatial variability of the seismic ground motion in near-field conditions on long bridge structures". Author: Cristian Gianni. PhD in Structural, Seismic and Geotechnical Engineering (Politecnico di Milano), XXVII cycle, executive Ph.D.
- "Numerical Modelling of Soil Structure Interaction on Seismic Analysis of RC Integral Bridge" Author: Sreya Dhar. PhD at the Department of Civil Engineering of the Indian Institute of Technology, Guwahati, India (2014-2018).
- "Biomechanical implantable device modelling: critical issues for reliable prediction of fatigue behaviour". Author: Dario Allegretti. PhD in Bioengineering (Politecnico di Milano), XXX cycle
- "Caratterizzazione delle proprietà termo-meccaniche del Nitinol per stent periferici". Author: Elena Dordoni. PhD in Bioengineering (Politecnico di Milano), XVII cycle.
- "A Displacement Based Seismic Assessment Procedure for Multi-Span Reinforced Concrete Bridges". Author: Oguz Bahadir Sadan. PhD in Structural, Seismic and Geotechnical Engineering (Politecnico di Milano), XXI cycle
- "Development of a Fibre Flexure-Shear Model for Seismic Analysis of RC Framed Structures". Author: Paola Ceresa. PhD at European School for Advanced Studies in Reduction of Seismic Risk (ROSE School, Pavia), XIX cycle.
- "Seismic Innovative Material and Device". Author: Alessandro Reali. PhD at European School for Advanced Studies in Reduction of Seismic Risk (ROSE School, Pavia), XVIII cycle.

COMMISSION MEMBER OF PHD FINAL EXAM IN THE FOLLOWING PHD PROGRAM:

- PhD in Structural, Seismic and Geotechnical Engineering, Politecnico di Milano.
- PhD in Computational mechanics and advanced materials, IUSS - Istituto Universitario di Studi Superiori, Pavia.
- PhD in Earthquake Engineering and Engineering Seismology (UME PhD), IUSS - Istituto Universitario di Studi Superiori, Pavia.
- PhD of the Department of Mechanical and Biomedical Engineering, National University of Ireland, Galway.

TEACHING ACTIVITY PROMOTER

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| 2006 – 2009 | Promoter of the Socrates Teaching Staff Mobility Program between Politecnico di Milano and University College of London, London (GB). |
| 2006 – 2007 | Promoter of the Socrates Teaching Staff Mobility Program between Politecnico di Milano (IT) and Université Montpellier II, Montpellier (FR). |

ACADEMIC INSTITUTIONAL ROLES

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| 2013 – presently | Member of the Collegium of the PhD in Structural, Seismic and Geotechnical Engineering, Politecnico di Milano. |
| 2017– presently | Coordinator of MSc Architettura delle Costruzioni and Building Architecture, School of Architecture Urban Planning Construction Engineering, Politecnico di Milano. |
| 2006 – 2013 | Committee Member of the Scientific Commission of the Department of Structural Engineering, Politecnico di Milano. |

RESEARCH ACTIVITY

Main research topics

Lorenza Petrini has carried out her scientific work in the following areas: mechanics of materials, mechanics of devices in structural and biomedical field, earthquake engineering.

In particular, the main theme in her research activity in the field of mechanics of materials has been the study of Shape Memory Alloys (SMA) along the two following lines:

- i. development of a constitutive model able to describe the main features of SMA behavior and its implementation in finite element codes;
- ii. experimental study of SMA behavior in both static and dynamic conditions.

The interest to the SMA has led to study possible applications of these materials in both the structural and biomedical fields. Such research, still conducted both numerically and experimentally, has been developed in two main directions: i) feasibility study for a new seismic device dissipating energy through the mechanical hysteresis proper of the shape memory effect in SMA; ii) computational study and experimental validation of the behavior of Nitinol medical devices in order to be able to contribute to interpret the biological response during the implantation.

From here, the interest to biomechanical applications has grown and the research has been extended to:

- i. the development of computational models for the study of the mechanical properties of cardiovascular and endovascular prosthesis (coronary, peripheral and cerebral stents with and without bifurcations, drug eluting stents, angioplasty balloons, percutaneous pulmonary valves), and endodontic and orthodontic devices, with the aim of giving useful information to the physician in the choice of the most suitable device for the particular clinical case, and offering to companies a useful tool for the design of SMA or stainless steel devices;
- ii. the mechanical characterization and numerical implementation of biomaterials behaviour with peculiar attention to the fatigue response;
- iii. the development of innovative devices, in particular new heart valves to be percutaneously implanted in the pulmonary position (in collaboration with the Great Ormond Street Hospital of London) and biodegradable Magnesium alloy stent (in collaboration with the Department of Mechanics at Politecnico di Milano).

In the field of earthquake engineering Lorenza Petrini has extended her interest from SMA dissipating devices to various, experimental and theoretical issues. In particular, she has dealt with:

- i. experimental tests on shaking table both for evaluating the capabilities of a commercial shaking table and for improving our knowledge about damping models in nonlinear time history analyses.
- ii. analysis of seismic risk, where, in the frame of probabilistic seismic hazard analysis of a site, "generators of probability" - i.e. procedures leading to the definition of a risk index in probabilistic terms - have been investigated. In particular, attention has been paid to those generators that lead to the definition of the magnitude FM distribution function in a given area and to generators of seismic hazard.
- iii. procedure analysis and innovative criteria for seismic design and assessment of buildings and bridges. In the last ten years the Italian seismic code has been strongly revised. Lorenza Petrini has participated in this review and the dissemination of its results. Furthermore, she was recently in charge of the development and validation of a design and assessment procedure for bridges based on the "Direct Displacement Based" approach initially proposed by Priestley and colleagues a decade ago.

- iv. development of a flexure-shear fibre beam-column elements for improving the computational model prediction of the seismic response of existing non-seismically designed RC structures that are prone to shear-induced damage and collapse.

RESEARCH PROJECT

Leadership of research projects:

- 2017 – 2020 Workpakage leader in the project founded by European Commision in the program Horizon 2020: “InSilc. In-silico trials for drug eluting BVS design, development and evaluation” (grant agreement numero 777119).
- 2011 – 2013 National project founded by Fondazione Cassa di Risparmio di Trento e Rovereto: “Development of hybrid degradable magnesium stents with polymeric coating for biomedical applications”. Coordinator: Prof. M. Vedani, Politecnico di Milano (Operative Unit PI).
- 2010 – 2013 DPC-RELUIS Research Program, Line 2, “Displacement-based vulnerability assessment”. National coordinators: Prof. G. M. Calvi e Dr. T. J. Sullivan, Università degli Studi di Pavia (Operative Unit co-PI).
- 2009 – 2011 Research project “5 per mille junior” founded by Politecnico di Milano: “Development of bioabsorbable magnesium alloy innovative stents” (PI).
- 2005 – 2008 DPC-RELUIS Research Program, Line 4, “Development of displacement-based approaches for the design and vulnerability assessment”. National coordinators: Prof. G. M. Calvi and Prof. M. J. N. Priestley, Università degli Studi di Pavia (Operative Unit PI).
- 2001 – 2002 Research project “Young Researchers” founded by Università degli Studi di Pavia: “Numerical and experimental study of intravascular stents in pathologic vessels: comparison between stainless steel and Shape Memory Alloys stents” (PI).

Participation in research project

- 2015 – 2018 VPH-CaSE – VPH-Cardiovascular Simulation and Experimentation for Personalised Medical Devices, Marie Curie Initial Training Networks (ITN), call H2020-MSCA-ITN-2014
- 2014 – 2016 DPC-RELUIS Special Projects, RS2 “Earthquake simulations and near source effects”. National coordinators: R. Paolucci, Politecnico di Milano.
- 2011 – 2014 STREP European project (Project Identifier: FP7-2009-ICT-4-248801): “RT3S - Real Time Simulation for Safer vascular Stenting”. Scientific coordinator Prof. G. Dubini, Politecnico di Milano.
- 2009 – 2012 EC Marie Curie Actions – Networks for Initial Training (ITN) Call identifier FP7-PEOPLE-ITN-2008 MeDDiCA - Medical Devices Design in Cardiovascular Applications - Project No. 238113.
- 2010 – 2012 Research project “Young Researchers” founded by the Department of Structural Engineering of the Politecnico di Milano: “Study of the non linear dynamic behaviour of deep foundations for displacement-based seismic assessment of existing bridges”. Coordinator Dr. A. Galli.
- 2007 – 2009 National project founded by Fondazione Cassa di Risparmio di Trento e Rovereto: “Degradable magnesium alloys for biomedical applications”. Coordinator: Prof. F. Migliavacca, Politecnico di Milano.

2007 – 2009	INGV-DPC Research Program: “Project S_2 - Development of a dynamical model for seismic hazard assessment at national scale”. National coordinators Prof. E. Faccioli, Politecnico di Milano, and Dr. W. Marzocchi, INGV-Roma 1.
2006 – 2008	National project PRIN founded by Ministry of Education, University and Research: “Shape memory Alloy micro-actuators and devices for biomedical applications: constitutive modeling, structural analysis, design and use of laser techniques for the production and verification of prototypes”. National coordinator Prof. F. Auricchio, Università degli Studi di Pavia.
2004 – 2006	National project COFIN founded by Ministry of Education, University and Research: “Shape memory Alloys: constitutive modeling, structural analysis, experimental validation and design of innovative biomedical devices”. National coordinator Prof. F. Auricchio, Università degli Studi di Pavia.
2004 – 2006	National project COFIN founded by Ministry of Education, University and Research: “Seismic safety of existing buildings – development of methods and applications National coordinator Prof. P.E. Pinto, Università degli Studi di Roma.
2004 – 2006	INGV-DPC Research Program: “Project S_2 – Probable earthquake in Italy in the thirty years 2005-2035”. National coordinators Dr. D. Slejko and Dr. G. Valensise, INGV.
2002 – 2004	CNR-GNDT Research Program: “Probable earthquake in Italy between the year 2000 and 2030: elements for the definition of priorities of interventions to reduce the seismic risk”.
2002 – 2003	National project MURST founded by Ministry of University and Research: “Shape memory Alloys: constitutive modeling, structural analysis, experimental validation and design of innovative biomedical devices”. National coordinator Prof. F. Auricchio, Università degli Studi di Pavia.
2002	Research project founded by FIAT Research Center: “Adaptive functional composites”
2001 – 2004	Collaborative project between Italy and France: “Lagrange laboratory”. Coordinator Prof. F. Maceri, Università degli Studi Roma Tor Vergata.
2001	Project Agenzia 2001 founded by CNR: “Tridimensional finite element biomechanical analysis of stent implants and of the mechanical endoprosthesis-vessel interaction”, Coordinator Prof. F. Auricchio, Università degli Studi di Pavia.
1999 – 2001	Research project Special Materials for Advanced Technology II founded by CNR: “Shape Memory Alloys: development of a not viscous constitutive model for the simulation of devices with memory”. Coordinator Prof. F. Auricchio, Università degli Studi di Pavia.
1998	Research project founded by CNR: “Intelligent materials for structural engineering”. Coordinator Prof. F. Casciati
1998	Research project founded by the Università degli Studi di Pavia (Fondo di Ateneo di Ricerca): “Techniques for the structural identification aimed at structural control”. Coordinator Prof. L. Faravelli.
1997	Research project founded by CNR: “Numerical and experimental methods and models for nonlinear materials with memory (SMA)”. Coordinator Prof. F. Casciati.
1996	Research project founded by CNR: “Complex system design”. Coordinator Prof. F. Casciati.

Activity of research supervision

March 2008 – February 2012	Supervisor of the research carried out by Claudio Capelli, PhD student at the University College of London, founded by the British Heart Foundation: “Structural analysis of stent for percutaneous valve implantation”.
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- May – September 2006 Research project founded by CNR: "Numerical and experimental methods and models for nonlinear materials with memory (SMA)". Supervisor of the research carried out by Claudio Capelli, visiting student at the University College of London: "Computational analysis of balloon angioplasty".
- April 2004 – March 2008 Supervisor of the research carried out by Silvia Schievano, PhD student at the University College of London, founded by the British Heart Foundation: "Computational structural analysis as a tool to develop valved stent applications and technology".

Research activity in foreign universities

- June – July 1999 Research Scholar at the Smirnov Scientific Research Institute of Mathematics and Mechanics (NIIMM) of the St. Petersburg State University (RU) in the frame of the European Project EU-INTAS.
- July – August 1997 Research Scholar at the Sussex University, Brighton (UK) through the International Exchange Program "Human and Capital Mobility Network, Stochastic Mechanics in Structural and Mechanical Engineering".

SCIENTIFIC COLLABORATIONS

Lorenza Petrini has carried out research activities in collaboration with the following national and international centres

- ANSYS – France (Lyon), scientific partnership (Dr. M. Rochette).
- CNR-ICMATE, Lecco (Dr. E. Villa and A. Nespoli)
- Department of Chemistry, Materials and Industrial Chemistry 'G. Natta', Politecnico di Milano (Prof. S. Farè)
- Department of Dentistry, Istituto Galeazzi, Università degli Studi di Milano (Dott. S. Taschieri)
- Department of Engineering and Architecture, Università di Parma (Prof. A. Spagnoli)
- Department of Industrial Engineering, Università di Cassino (Prof. E. Sacco)
- Department of Mathematics 'F. Brioschi', Politecnico di Milano (Dr. P. Zunino)
- Department of Mechanics, Politecnico di Milano (Prof. B. Previtali and M. Vedani)
- Department of Orthodontics, Policlinico S. Matteo, Università degli Studi di Pavia (Dott. V. Cacciafesta)
- Department of Structural Mechanics, Università degli Studi di Pavia (Prof. F. Auricchio)
- Division of Specialized Materials and Devices, Institute of Metal Research, Chinese Academy of Sciences, Shenyang, China (Prof. Ke Yang)
- European Centre for Training and Research in Earthquake Engineering, Pavia (Prof. G.M. Calvi)
- Great Ormond Street Hospital for Children, NHS Trust, University College of London (Prof. P. Bonhoeffer, S. Schievano, Dr. C. Capelli)
- Group for Computational Imaging and Simulation Technologies in Biomedicine (CISTIB), Universitat Pompeu Fabra, Barcellona (Prof. A. Frangi).
- Laboratory of Biological Structure Mechanics (LaBS), Politecnico di Milano (Prof. G. Dubini, F. Migliavacca, G. Pennati)
- Laboratory of Hemodynamics, Erasmus University Rotterdam, the Netherlands (Dr. Frank Gijzen)
- Laboratoire de Biomateriaux et Bioingénierie de l'Université Laval in Quebec City (Prof. D. Mantovani)
- LMGC - CNRS, Université Montpellier II, Montpellier (Dr. R. Peyroux)
- Medical Physics Group, Department of Cardiovascular Science, Faculty of Medicine, Dentistry and Health, University of Sheffield, Sheffield (Dr. P. Lawford, Prof. R. Hose)

NATIONAL AND INTERNATIONAL CONFERENCES

Presentations held in national and international conferences:

- 2018 ESMC - 10th European Solid Mechanics Conference, Bologna, 2-6/7 (paper accepted for oral presentation)
- 2018 ECF22 - 22nd European Conference on Fracture, Belgrado (RS), 26-31/8 (paper accepted for oral presentation)
- 2017 ESB - 23rd Congress of the European Society of Biomechanics, Sevilla (ES), 2-5/6.
- 2017 SMST2017 - Shape Memory and Superelastic Technologies Conference & Exposition, San Diego (USA), 15-19/5.
- 2016 Simulia Regional User meeting, Milan (IT), 18-19/11.
- 2015 ESVB - IX European Symposium of Vascular Biomaterials, Strasbourg (FR), 6-7/10.
- 2014 AIM - 35° Convegno nazionale AIM, Rome (IT), 5-7/11.
- 2014 GIMC-GMA2014 - XX Convegno Nazionale di Meccanica Computazionale, VII Riunione del Gruppo Materiali AIMETA, Cassino (IT), 11-13/6.
- 2013 AIMETA2013 – XXI Congresso dell’Associazione Italiana di Meccanica Teorica e Applicata, Turin (IT), 17-20/9.
- 2013 SMART2013 – 6th ECCOMAS Thematic Conference on Smart Structures and Materials, Turin (IT), 24-26/6.
- 2013 SMST2013 - The International Conference on Shape Memory and Superelastic Technologies, Prague (CZ), 20-24/5.
- 2012 VPH – Virtual Physiological Human: integrative approaches to computational biomedicine, London (UK) 18-20/9.
- 2012 CMBBE12 - 10th International Symposium on Computer Methods in Biomechanics and Biomedical Engineering, Berlin (DE), 11-14/4.
- 2011 ART11 – 10th International Conference on non-destructive investigations and microanalysis for the diagnostics and conservation of cultural and environmental heritage, Florence (IT), 13-15/4.
- 2010 SEMC 2010 - IV International Conference on Structural Engineering, Mechanics and Computation, Cape Town (ZA), 6-8/9.
- 2009 ANIDIS2009 - XIII Convegno ANIDIS L’ingegneria sismica in Italia, Bologna (IT), 28/6-2/.
- 2008 14WCEE - 14th World Conference on Earthquake Engineering, Beijing (CN) 12-17/10.
- 2008 SMST2008 - The International Conference on Shape Memory and Superelastic Technologies, Stresa (IT), 21-25/9.
- 2006 ECCM2006 - III European Conference on Computational Mechanics, Lisbon (PT) 5-9/6.
- 2003 AIMETA’03 - XVI Congresso AIMETA di Meccanica Teorica e Applicata, Ferrara (IT), 9-12/9.
- 2003 ASME - Summer Bioengineering Conference, Key Biscayne, Florida (USA) 25-29/6.
- 2002 ICAST '02 - 13th international conference on adaptive structures and technologies. Postdam/Berlin, (DE) 7-9/10.
- 2002 GIMC2002 - Third joint conference of Italian group of computational mechanics and Ibero-association of computational methods in engineering, Giulianova (IT) 24-26/6.
- 2002 COLLOQUIUM LAGRANGIANUM Matériaux à fonctions multiples, Castel del Monte et Castello Svevo di Trani (IT), 9-11/9.
- 2001 ASME - International Mechanical Engineering Congress & Exposition, New York (USA), 11-16/11.
- 2001 V International Symposium on Computational Methods in Biomechanics & Biomedical Engineering, Rome (IT), 31/10-3/11.
- 2001 AIMETA’01 - XV Congresso AIMETA di Meccanica Teorica e Applicata, Taormina (IT), 26-29/9.
- 2000 GIMC2000 - XIII Congresso italiano di Meccanica Computazionale, Brescia (IT), 13-15/11.

- 2000 ESOMAT - V European Congress on Martensitic Transformations and Shape Memory Alloys, Como (IT), 4-8/9.
- 1998 4th European Conference on Smart Structures and Materials – 2nd International Conference on Micromechanics, Intelligent Materials and Robotics, Harrogate (UK) 6-8/7.
- 1998 Second World Conference on Structural Control, Kyoto (JP) 28/6–1/7.
- 1997 Congresso FAST ‘Materiali, ricerca e prospettive tecnologiche alle soglie del 2000’, Milan (IT), 10-14/11.
- 1997 ANIDIS’97 - VIII Convegno Nazionale ‘L’Ingegneria Sismica in Italia’, Taormina (IT), 21-24/).

Chairperson in national and international conferences:

- GIMC-GMA 2014 - XX Convegno Nazionale di Meccanica Computazionale VII Riunione del Gruppo Materiali AIMETA, Cassino (IT), 11-13/6/2014.
- IABMAS 2012 - 6th International Conference on Bridge Maintenance, Safety and Management, Stresa (IT), 8-12/6/2012.
- CMBEE 2012 - 10th International Symposium on Biomechanics and Biomedical Engineering, Berlin (DE), 11-14/4/2012.
- EUROMAT11 - European Congress on Advanced Materials and Processes, Montpellier (FR) 12-15/9/2011.
- WCCM8 - 8th World Congress on Computational Mechanics, Venice (IT), 30/6–5/7/2008.

Organization of symposium

- Co-organizer, with Prof. Vena and Prof. Hellmich, of mini-symposium “Mechanical characterization and modeling of tissues and biomedical materials at all length scales” in EUROMAT 2011 European Congress on Advanced Materials and Processes, Montpellier (FR), 12-15/9/2011.
- Co-organizer, with Prof. Garavaglia and Prof. Castellani, of the “Worshop in honor and memory of Giuseppe Grandori” helded at Politecnico di Milano on November 5, 2012.

REVIEWER ACTIVITIES

- Lorenza Petrini is reviewer for the following international journals
- Acta Biomaterialia
- Annals of Biomedical Engineering
- Annals of Solid and Structural Mechanics
- Biomechanics and Modeling in Mechanobiology
- Bulletin of Earthquake Engineering
- Computer Methods in Applied Mechanics and Engineering
- Earthquake Engineering and Structural Dynamics
- Earthquake Spectra
- Engineering Structures
- International Journal of Cardiology
- International Journal of Solids and Structures
- Journal of Biomechanics
- Journal of Earthquake Engineering
- Journal of the Mechanical Behavior of Biomedical Materials
- Journal of Material Engineering and Performance

- Journal of Materials Science: Materials in Medicine
- Medical & Biological Engineering & Computing
- Medical Engineering & Physics
- The International Journal Of Artificial Organs

AFFILIATIONS

AIMETA, Associazione Italiana di Meccanica Teorica e Applicata

GIMC, Gruppo Italiano di Meccanica Computazionale

ESB, European Society of Biomechanics.

PUBLICATIONS:

70 papers in peer-reviewed international journals, indexed by ISI-Web of Knowledge/Scopus

3 paper in Italian journal

2 papers in open access journal

7 chapters in international books

7 chapters in Italian books

3 books (2 in Italian and 1 in English)

2 thesis

Number of citations:

2215/1846 by 1508 citing articles, 72 documents considered, h Index 25/23 with/without self-citations of all authors (according to Scopus database)

1804 (1719 without self-citations of all authors) by 1217 citing articles (1179 without self-citations of all authors), average citations per item 27,33 h Index 23, 66 documents (according to ISI Web of Knowledge database)