



UNIVERSITÀ POLITECNICA DELLE MARCHE

Supervisor: Prof. Giovanni Lancioni

Dept. of Civil Engineering, Construction and
Architecture (DICEA)



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Research topics, Research Projects



Research topics

Current Research Activities

- Nonlocal variational formulations for damage, plasticity, and other inelastic phenomena
- Phase-field models of fracture and their numerical implementation
- Finite viscoelasticity and fracture models for describing time-dependent fracture mechanisms in elastomers
- Theoretical and FEM models for fracture in composites, fiber-reinforced, and multiphase materials
- Plasticity of metallic materials

Additional Research Interests

- Dynamics of electroelastic and anisotropic plates
- Nonlinear dynamics of cables and beams subjected to unilateral constraints
- Numerical strategies for the implementation of absorbing boundary conditions
- Nonsmooth dynamics of systems with impact and friction, with applications to masonry structures

Coordination of Funded Research Projects

- Since September 2023, Principal Investigator of PRIN 2022 project “TWYRES: a digital TWin for fracture and fatigue simulations in tYRES”. Funding: 249.427 Euro.
- Principal investigator of 3 Young Investigator Projects funded by GNFM in the years 2008-09, 2010-11, 2013-14. 2008 – 2009. GNFM Young Investigator Project “Propagazione ondosa in travi di lunghezza infinita poste su un letto di molle elastiche: condizioni al contorno non-riflessive di ordine elevato ed algoritmo numerico agli elementi finiti”.
- Principal investigator of project FSE 2002 POR Ob. 3 Marche - Asse D, misura D4, 2003-2004.

He has participated in national and international projects, including 3 PRIN projects, an International Joint Project, funded by Royal Society, London.



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Short CV



- Associate Professor of Structural Mechanics (“Scienza delle Costruzioni”), Polytechnic University of Marche, Italy, since 2020.
- Previously, Assistant Professor at UnivPM (2006-2020), post-doctoral fellow (2004-05 at ENEA, Casaccia, 2005-06 at UnivPM), PhD in Structural Engineering, University of Rome “Tor Vergata”, 2002
- *Qualifications*. Italian National Scientific Qualification (Abilitazione Scientifica Nazionale) for the position of Full Professor in Structural Mechanics (SSD ICAR/08), 2021

Teaching and tutoring

- *Teaching*. PhD Courses taught at University of Warwick, UK, 2018, and at Middle East Technical University, Ankara, Turkey, 2017; Courses taught since 2002 for Bachelor and Master degrees: Structural Dynamics, Structural Mechanics, Mechanics of Solids and Structures, Numerical Analysis of Structures.
- *Tutoring*. 24 Master Theses, 4 Bachelor Theses 3 PhD thesis (co-supervisor). Faculty board Member of the Doctorate School “Ingegneria Civile, Ambientale, Edile e Architettura” since 2013

Research activity

- Author of 34 papers in peer-review International Journals, 8 book chapters, 15 congress proceedings indexed in Scopus and/or WOS, 16 congress proceedings
- Delivered presentations at 60 congresses and workshops (6 invited talks), 11 seminars
- *Visiting appointments*. University of Warwick, UK, 2018; University of Oxford, UK, 2013; Institute for Energy and Transport, The Netherlands, 2013; Imperial College, London, UK 2006-2007
- Reviewer of more than 70 papers for peer-review international journals
- *Awards*. Winner of “Finanziamento delle attività base di ricerca” by MIUR, 2017. Research prize for Best Young Researchers awarded by UnivPM, 2010
- TECHNOLOGY TRANSFER Partner of the innovative start-up INNOVACRETE S.R.L. for the development and production of ultra-high performances cementitious-based materials (from 2016 to 2020).



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Selected papers



Selected papers

- J. Ciambella, G. Lancioni, N. Stortini, A finite viscoelastic phase-field model for prediction of crack propagation speed in elastomers, *European Journal of Mechanics – A/Solids*, Vol 113, 105678, 2025
- G. Del Piero, G. Lancioni, R. March, *One-dimensional failure modes for bodies with non-convex plastic energies*, *Journal of Elasticity*, 2023, DOI: 10.1007/s10659-023-09989-6
- J. Ciambella, G. Lancioni, N. Stortini, *An Ogden-like formulation incorporating phase-field fracture in elastomers: from brittle to pseudo-ductile failures*. *Phil. Trans. R. Soc. A*, 380: 20210323, 2022
- J. Donnini, G. Lancioni, G. Chiappini, V. Corinaldesi, *Uniaxial Tensile Behavior of Ultra-High Performance Fiber-Reinforced Concrete (Uhpfrc): Experiments and Modeling*, *Composites Structures*, 258, 113433, 2020
- G. Lancioni, R. Alessi, *Modeling micro-cracking and failure in short fiber-reinforced composites*, *Journal of the Mechanics and Physics of Solids*, 137, 103854, 2020
- G. Lancioni, T. Yalcinkaya, A. Cocks, *Energy based non-local plasticity models for deformation patterning, localization and fracture*, *Proceedings of the Royal Society A: mathematical, physical and engineering sciences*, 471: 20150275, 2015
- G. Lancioni, *Modelling the response of tensile steel bars by means of incremental energy minimization*, *Journal of Elasticity*, 121(1), 25-54, 2015

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Research group



Members of the research group of Structural Mechanics

- Prof. Eng. Fabrizio Davì (Full Professor)
- Prof. Eng. Stefano Lenci (Full Professor)
- Prof. Eng. Francesco Clementi (Full Professor)
- Prof. Eng. Giovanni Lancioni (Associate Professor)
- Prof. Eng. Michele Serpilli (Associate Professor)
- Prof. Eng. Pierpaolo Belardinelli (Associate Professor)
- Prof. Arch. Valeria Settimi (Associate Professor)

Topics

Classical and innovative topics of theoretical and applied mechanics of solids and materials. In particular, Prof. Lancioni contributes to develop of the following issues.

Mechanics of materials (classical and new materials)

- Multifield theories for the mechanical behavior of materials
- Fracture mechanics
- Composite materials and their application

Structural modelling

- Linear and nonlinear structural mechanics of mono- and bidimensional structures
- Elasticity of anisotropic materials
- Predictive modelling of oil pipelines

Dynamics and Stability of structures

- Nonlinear dynamics of structures

Computational mechanics

- Numerical models for fracture mechanics and plasticity
- Algorithms for non-reflective infinite structures

Website: <https://dicea.univpm.it/sezioni-tematiche/scienza-delle-costruzioni/>





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Laboratories and tools



The Official Materials and Structures Testing Laboratory specialises in carrying out tests for the mechanical characterisation of materials, using presses and small electro-hydraulic actuators, quasi-static, cyclic and pseudo-dynamic tests on structural components and prototype scale structures.

Specific tests for validation of theories and models are listed in the following.

Testing of materials

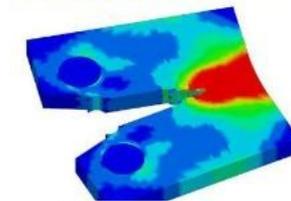
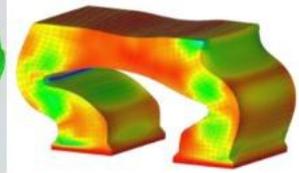
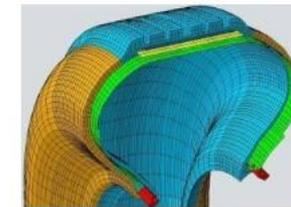
- Tests for the material mechanical characterisation (elastic moduli, tensile stresses, shear tests, multi-axial states).
- Characterisation tests on fracture and damage resistance of materials.

Tests on structural components and structures

- Dynamic characterisation tests (e.g. dynamic identification).
- Quasi-static and pseudo-dynamic tests on structural components and full-scale structures (frames, beam-column nodes, etc.).
- Mechanical characterisation tests (centred load/eccentric load/diagonal compression, shear, bending) of panels of different construction (e.g. standard masonry, brickwork, SIP).

Website: <https://dicea.univpm.it/en/laboratories/lab-lpms-en/>

In addition, the research group has access to a **high-performance computer** for carrying out computationally intensive numerical simulations and supporting large-scale fem modeling.



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