Pietro Lenarda

Personal data

Born November 4, 1986 in Florence (Italy)

Resident Florence (Italy)

Current position and habilitation

1 Dec. 2023 - 30 Nov. 2026 **Tenure Track Assistant Professor RTD-B at IMT School for Advanced Studies in Structural Mechanics ICAR/08**, *Research Unit MUSAM Multi-scale Analysis of Materials*, Lucca, Italy

16 Mar. 2022 Valutazione della Qualità della Ricerca (VQR) 2015-2019. Evaluation: **class A** (Eccellente ed estremamente rilevante), for all the articles submitted

2 Mar. 2023 **National Habilitation as Associate Professor in Solid and Structural Mechanics ICAR/08**, by the Italian Ministry of University and Research, MIUR

Former positions

15 Nov. 2019 - 15 Nov. 2024 **Assistant Professor RTD-A at IMT School for Advanced Studies in Structural Mechanics ICAR/08**, *(Contract renewal 15 Nov. 2022-15 Nov. 2024 founded by the Italian Recovery Plan PNRR) Research Unit MUSAM Multi-scale Analysis of Materials*, Lucca, Italy

15 Sep. 2017 - 15 Jul. 2019 **PostDoc (assegnista di ricerca post-dottorale) in Computational Nanomedicine at IIT, Italian Institute of Technology**, *Laboratory of Nanotechnology for Precision Medicine*, Genova, Italy

15 Nov. 2016 - 15 Sep. 2017 **Research Collaborator at IMT Institute for Advanced Studies**, *Research Unit MUSAM Multi-scale Analysis of Materials*, Lucca, Italy

Education

23 Mar. 2017 **PhD. in Computational Mechanics**, *Cycle XXIX (Nov. 2013-Oct. 2016), with MUR scholarship, IMT School for Advanced Studies, Lucca, Italy*

Supervisor: Prof. M. Paggi (IMT, School for Advanced Studies), Supervisor for the visiting period: Prof. R. Ruiz-Baier (University of Oxford, UK):

Modeling and Simulation of a Class of Nonlinear Coupled Reaction-Diffusion Problems for Green Applications http://e-theses.imtlucca.it/id/eprint/219

PhD committee: Prof. M. Di Paola (University of Palermo), Prof. G. Zavarise (University of Salento), Prof. R. Ruiz-Baier (University of Oxford) marked the thesis: excellent

24 Jul. 2013 **Master in Applied Mathematics**, *Laurea Magistrale LM-40 in Matematica (Oct. 2010 -Jul. 2013) University of Florence, Istituto Matematico U. Dini*
Supervisor: Prof. A. Gandolfi:

Representation of Gibbs States in Phase Transition's Theory and Graphical Models

Research interests

My interests regard computational methods for the numerical solution of nonlinear coupled phenomena in continuum mechanics, with special applications to biomechanics. Original contributions regarded the following topics relevant for high-fidelity digital twin models:

- **Phase field** models for **brittle fracture**, development of decomposition methods for the energy density function for materials undergoing damage both in tension and in compression (multi-phase field), their implementation in Finite Element softwares, and experimental validation (collaboration with Prof. J. Reinoso from University of Seville [4]; national collaboration with Prof. D. Bigoni from University of Trento [3]). Ongoing work regards the investigation of damage in artificial porous materials mimicking bones [S1] and damage assessment inside human vertebra after screws fixation, in collaboration with the group of Prof. A. Gizzi from University Campus Bio-Medico, Rome.
- **Structure-based** nonlinear hyperelastic models coupled with electrophysiology for human organs (Ogden-Holzapfel models) accounting for fiber orientation in the tissue. Ongoing work regards the realization of twin models of the **gastrointestinal system** leading to patient-specific in-silico tools unveiling the principles governing food digestion and disease mechanisms at different scales (colaboration with San Luca Hospital, Lucca; Sigma Ingegneria srl, Lucca; University Campus Bio-Medico, Rome).
- Finite element formulation and numerical simulation of **thermo-rheologically complex** behaviour in materials with memory via **fractional calculus**. Applications regarded the development of digital twin models for materials for renewable energy, such as to **viscoelastic polymers** used as encapsulant in **photovoltaics** [15]. Novel FE software has been developed to simulate thermo-hygro-chemo-mechanical degradation phenomena in photovoltaics under environmental and accelerated ageing test conditions to predict their long term durability [14] (collaboration with Prof. M. Paggi, IMT School for Advanced Studies Lucca, as member of the ERC StG project: "Multi-field and multi-scale Computational Approach to Design and Durability of PhotoVoltaic Modules").
- Development of coupled **Lattice-Boltzmann Immersed boundary** methods for fluid-structure interaction for the simulation of transport of deformable **circulating tumor cells and deformable nanoparticles** in 3D microcapillary flows [11] (collaboration with the group of Nanothechnology for Precision Medicine of Prof. P. Decuzzi at the Italian Institute of Technology, Genoa, Italy as memeber of the ERC CoG project: POTENT "Engineering Discoidal Polymeric Nanoconstructs for the Multi-Physics Treatment of Brain Tumors").
- Theoretical and computational models for the simulation of coupled problems in the mechanics of cardiac myocytes and **cell electrophysiology** [12]. The work, done in collaboration with the University Campus Bio-Medico of Rome, Italy, innovated on providing the first computational model for the **electro-mechanical interaction** between cardio-myocytes.
- Novel numerical splitting techniques for **reaction-advection-diffusion systems** involving chemical and biological species in **Brinkman stationary flows** (generalized Stokes equations for fluids inside porous media) [13], developed in collaboration with Prof. R. Ruiz-Baier at the Numerical Analysis Dept. of University of Oxford, UK.
- Interdisciplinary research in collaboration with Prof. M. Riccaboni (Director of the research unit AXES - Analysis of compleX Economic Systems at IMT, Lucca) and Prof. G. Gnecco on the development of new algorithms for estimating parameters in a **social network model** [8]. Collaboration with Prof. A. Gandolfi, University of Florence, on **Gibbs and Markov random**

fields on graphs [16].

Conferences

2023, 17 - 20 Jan. **Presenter at NewFrac and TC16 - JOINT WORKSHOP – Politecnico di Torino**, *Torino, Italy*
D. Préve, P. Lenarda, I. Maskery, M. Paggi: A comprehensive characterization of fracture in unit cell open foams generated from Triply Periodic Minimal Surfaces.

2022, 29 - 30 Sept. **Presenter* at GIMC SIMAI Young 2022**, *Pavia, Italy*
P. Lenarda, M. Paggi: Multi-phase field approach to tensile and compressive failures in granular materials.

2022, 4-8 Sept. **Presenter* at AIMETA XXV Conference**, *Palermo, Italy*
P. Lenarda, R. Cavuoto, D. Misseroni, M. Paggi, D. Bigoni: Crack propagation in plates with holes and notches: an experimental assessment of the phase field model.

2022, 9 - 12 May **Presenter* at NewFrac - WORKSHOP 2 - IMT School Lucca**, *Lucca, Italy*
P. Lenarda, R. Cavuoto, D. Misseroni, D. Bigoni, M. Paggi: Failure through crack propagation in plates with holes and notches: An experimental assessment of the phase field model.

2021, 30 Aug. - 3 Sept. **Presenter* at SIMAI bi-annual congress of the Italian Society of Applied and Industrial Mathematics**, *Parma, Italy*
P. Lenarda, M. Paggi: Multi-phase field approach to tensile and compressive failures in brittle materials.

2021, 22 - 27 Aug. **Presenter* at ICTAM 25 International Congress of Theoretical and Applied Mechanics**, *Milan, Italy*
P. Lenarda, M. Paggi: Phase field approach to tensile fracture and compressive crushing in brittle materials

2019, 3 - 5 Jun. **Presenter* at ECCOMAS VII International Conference in Coupled Problems in Science and Engineering**, *Sitges, Spain*
P. Lenarda, H. Mollica, M. E. Miali, P. Decuzzi: Modeling and simulation of capillary transport and adhesion of nanoparticles in whole blood.

2019, 13 - 14 Sept. **Invited talk* at GIMC XXII - GMA IX Conference**, *Ferrara, Italy*, XXII National Conference of Computational Mechanics and the IX Meeting of the AIMETA Materials Group
Best Ph.D thesis award for Modelling and Simulation of a Class of Nonlinear Coupled Reaction-Diffusion Problems for Green Applications.

2018, 22 - 27 Jul. **Presenter* at WCCMXIII and PANACM II**, *New York, USA*, 13th World Congress in Computational Mechanics
P. Lenarda, A. Coclite, M. E. Miali, H. Mollica, A. L. Palange, P. Decuzzi: Modelling the Capillary Transport of Deformable Cells Via a Lattice-Boltzmann Method.

2017, 28 - 29 Sept. **Presenter* at ESB-ITA VII Annual Meeting Rome**, *Rome, Italy*, Italian Chapter of the European Society of Biomechanics
P. Lenarda, A. Gizzi, M.Paggi: A modeling framework for contact, adhesion and mechano-transduction between excitable deformable cells.

2017, 14 - 16 Jun. **Presenter* at CFRAC V Conference**, *Nantes, France*, V International Conference on Computational Modeling of Fracture and Failure of Materials and Structures
P. Lenarda, M. Paggi: Phase field approach to brittle fracture for functionally graded materials.

2016, 27 - 29 Jun. **GIMC-GMA Conference**, *Lucca, Italy*, XXI congress of the italian association on computational mechanics, VIII meeting of the AIMETA group of material science
M. Gagliardi, P. Lenarda, M. Paggi: A computational method to simulate thermo-oxidative degradation phenomena of poly(ethylene-co-vinyl acetate) used in photovoltaics.

2016, 5 - 9 Jun. **Presenter* at XI International Congress on Thermal Stresses**, *Salerno, Italy*, Iternational forum for scientists and engineers from academia, research laboratories, and industry involved in the field of thermal stresses
P. Lenarda, M. Paggi: A fully implicit thermo-visco-elastic finite element formulation for thermo-rheologically complex polymers based on fractional calculus.

2015, 14 - 17 Sept. **Presenter* at AIMETA XXII Conference**, *Genoa, Italy*, XXII Congress of the italian association of theoretical and applied mechanics.
P. Lenarda, M. Paggi: A geometrical multi-scale numerical method for coupled hygro-thermo-mechanical problems in photovoltaic laminates.

Other confrences in 2023

2023, 10-14 Sept. **Co-author of an invited plenary lecture at Fracture Mechanics of Concrete and Concrete Structures (FraMCoS 11)**, *Bangalore, India*
M. Paggi, P. Lenarda: Advances on high-fidelity phase-field models for fracture mechanics of quasi-brittle materials and interfaces.

2023, 14 - 15 Sept. **Invited talk* at 2nd German-Italian Workshop on Computational Mechanics**, *Aachen, Germany*
P. Lenarda: Recent advancements on digital twin models for coupled problems in bio-medical engineering.

2023, 12 - 14 Jul. **Presenter* at joint AIMETA XXIII Congress, GIMC X Congress, GMA II Congress and GBMA**, *Reggio Calabria, Italy*
P. Lenarda, D. Preve, D. Bianchi, A. Gizzi: Phase field modeling and FEM simulation of bone fracture occurring in human vertebra after screws fixation procedure.

* Presenter as first author.

Peer reviewed publications

[1] R.T. Djoumessi, **P. Lenarda**, A. Gizzi, S. Giusti, P. Alduini, M. Paggi (2024) In silico model of colon electromechanics for manometry prediction after laser tissue soldering, *Computer Methods in Applied Mechanics and Engineering*, 426, 116989, ISSN: 0045-7825, https://doi.org/10.1016/j.cma.2024.116989

[2] R. Cavuoto, **P. Lenarda**, A. Tampieri, M. Paggi, D. Bigoni (2023) Phase-field modelling of failure in ceramics with multiscale porosity, *Materials and Design*, 238, 112708, ISSN: 0264-1275, https://doi.org/10.1016/j.matdes.2024.112708

[3] A. Dusane, **P. Lenarda**, M. Paggi (2023) Computational modeling of viscoelastic backsheet materials for photovoltaics, *Mechanics of Materials*, 186, 104810, ISSN: 0167-6636, https://doi.org/10.1016/j.mechmat.2023.104810

[4] D. Preve, **P. Lenarda**, D. Bianchi, A. Gizzi (2024) Phase field modelling and simulation of damage occurring in human vertebra after screws fixation procedure, *Computational Mechanics*, SN: 1432-0924, https://doi.org/10.1007/s00466-024-02450-y

[5] Z. Liu, **P. Lenarda**, J. Reinoso, M. Paggi (2023) A multifield coupled thermo-chemo-mechanical theory for the reaction-diffusion modeling in photovoltaics *International Journal for Numerical Methods in Engineering*, 124, 12: 2876-2901, ISSN: 1097-0207 https://doi.org/10.1002/nme.7233

[6] D. Preve, **P. Lenarda**, I. Maskery, M. Paggi (2022) A comprehensive characterization of fracture in unit cell open foams generated from Triply Periodic Minimal Surfaces *Engineering Fracture Mechanics*, 277, 108949, ISSN: 0013-7944 https://doi.org/10.1016/j.engfracmech.2022.108949

[7] R. Cavuoto, **P. Lenarda**, D. Misseroni, M. Paggi, D. Bigoni (2022) Failure through crack propagation in components with holes and notches: An experimental assessment of the phase field model *International Journal of Solids and Structures*, 257, 111798, ISSN: 0020-7683 https://doi.org/10.1016/j.ijsolstr.2022.111798

[8] **P. Lenarda**, J. Reinoso, M. Paggi (2022) Multi-phase field approach to tensile fracture and compressive crushing in grained heterogeneous materials *Theoretical and Applied Fracture Mechanics*, 122, 103632, ISSN: 0167-8442 https://doi.org/10.1016/j.tafmec.2022.103632

[9] **P. Lenarda**, M. Paggi (2021) A computational framework for rheologically complex thermo-visco-elastic materials *International Journal of Solids and Structures*, 236-237:111297, ISSN: 0020-7683 https://doi.org/10.1016/j.ijsolstr.2021.111297

[10] A. L. Palange, M. Ferreira, D. Di Mascolo, R. Palomba, **P. Lenarda**, A. Cook, P. Decuzzi (2020) Rational Design of Polymeric Nanoconstructs for Drug Delivery and Biomedical Imaging, Handbook of Harnessing Biomaterials in Nanomedicine, Jenny Stanford Publishing, 381-424 ISBN 978-981-4800-90-7 (Hardcover), 978-1-003-12525-9 (eBook) https://doi.org/10.1201/9781003125259-14

[11] P.K. Asur Vijaya Kumar, A. Dean, J. Reinoso, **P. Lenarda**, M. Paggi (2020) Phase field modeling of fracture in Functionally Graded Materials: Γ-convergence and mechanical insight on the effect of grading *Thin-Walled Structures*, ISSN: 0263-8231 https://doi.org/10.1016/j.tws.2020.107234

[12] **P. Lenarda**, G. Gnecco, M. Riccaboni (2020) Parameters estimation in a 3-parameters p-star model *Networks*, https://doi.org/10.1002/net.21992

[13] M. Paggi, A. Amicarelli, **P. Lenarda** (2020) SPH modelling of hydrodynamic lubrication: laminar fluid flow-structure interaction with no-slip conditions for slider bearings *Computational Particle Mechanics*, https://doi.org/10.1007/s40571-020-00362-1

[14] A. Amicarelli, M. Paggi, **P. Lenarda** (2019) SPH Modelling of Hydrodynamic Lubrication along Rough Surfaces *Lubricants*, 72(12): 103, ISSN: 2075-4442 https://doi.org/10.3390/lubricants7120103

[15] **P. Lenarda**, A. Coclite, P. Decuzzi (2019) Unraveling the vascular fate of deformable circulating tumor cells via a hierarchical computational model *Cellular and Molecular Bioengineering*, 72: 1–16, SN: 1865-5033 https://link.springer.com/10.1007/s12195-019-00587-y

[16] **P. Lenarda**, A. Gizzi, M. Paggi (2018) A modeling framework for electro-mechanical interaction between excitable deformable cells *European Journal of Mechanics - A/Solids*, 72: 374–392, ISSN: 0997-7538 https://doi.org/10.1016/j.euromechsol.2018.06.001

[17] **P. Lenarda**, M. Paggi, R. Ruiz-Baier (2017) Partitioned coupling of advection-diffusion-reaction systems and Brinkman flows. *Journal of Computational Physics*, 164: 93–106, ISSN: 0021-9991 https://doi.org/10.1016/j.jcp.2017.05.011

[18] M. Gagliardi, **P. Lenarda**, M. Paggi (2017) A reaction-diffusion formulation to simulate EVA polymer degradation in environmental and accelerated ageing conditions. *Solar Energy Materials and Solar Cells*, 344: 281–302, ISSN: 0927-0248 https://doi.org/10.1016/j.solmat.2017.02.014

[19] **P. Lenarda**, M. Paggi (2016) A geometrical multi-scale numerical method for coupled hygro-thermo-mechanical problems in photovoltaic laminates *Computational Mechanics*, 57: 947–963, SN: 1432-0924 https://doi.org/10.1007/s00466-016-1271-5

[20] A. Gandolfi, **P. Lenarda** (2016) A note on Gibbs and Markov random fields with constraints and their moments. *Mathematics and Mechanics of Complex Systems*, 4(3–4): 407–422, https://doi.org/10.2140/memocs.2016.4.407

Articles in conference procedia

[C1] M. Gagliardi, **P. Lenarda**, M. Paggi (2016) A computational method to simulate thermo-oxidative degradation phenomena of poly(ethylene-co-vinyl acetate) used in photovoltaics. *In proceedings of XXI Convegno Italiano di Meccanica Computazionale, June 26-27, 2016, Lucca, Italy.*

[C2] **P. Lenarda**, M. Paggi (2016) A fully implicit thermo-visco-elastic finite element formulation for thermo-rheologically complex polymers based on fractional calculus. *In Proceedings of the 11th Congress on Thermal Stresses, June 5-9, 2016, Salerno, Italy*, 150–154, ISBN: 978-88-99509-14-9.

Posters

[P1] **Presenter* at Workshop Challenges in modeling and simulations of nanoparticles in complex environments CECAM (May 2029)**, *IIT, Italian Institute of Technology, Genoa, Italy*,
Modeling the receptor-ligand mediated adhesion dynamics of deformable nanoparticles in whole blood capillary flow.

[P2] **Presenter* at Workshop at Soft Matter days 2018 (Nov. 2018)**, *Julich, Germany*,
A Computational framework to predict vascular transport and adhesion of circulating tumor cells.

Visiting periods

7 Mar. 2022 - 18 Mar. 2022 **Elasticity and Strength of Materials Dept. of Continuum Mechanics, School of Engineering, University of Seville**, *Seville, Spain*
Collaboration with Prof. J. Reinoso on the field of multi-phase field modelling of fracture behaviour of concrete in compression.

24 Jan. 2022- 28 Jan. 2022 **University Campus Bio-Medico of Rome**, *Rome, Italy*
Collaboration with Prof. Alessio Gizzi on cardiac tissue electrophysiology.

9 Jan. 2017- 20 Jan. 2017 **University Campus Bio-Medico of Rome**, *Rome, Italy*
Collaboration with Prof. Alessio Gizzi on modeling of contact, adhesion and mechano-transduction between excitable deformable cells.

5 Sep. 2017- 7 Sep. 2017 **University Campus Bio-Medico of Rome**, *Rome, Italy*
Continuation of the collaboration with Prof. Ricardo Ruiz-Baier from Unversity of Oxford, UK, on partitioned coupling for advection-diffusion-reaction systems and Brinkman flows.

28 Apr 2016- 30 May 2016 **University of Oxford, Numerical Analysis Dept.**, *Oxford, UK*
Collaboration with Prof. Ricardo Ruiz-Baier on partitioned coupling for advection-diffusion-reaction systems and Brinkman flows.

21 May 2015- 22 May 2015 **Ecole Polytechnique Fédérale de Lausanne, EPFL**, *Lausanne, Switzerland*
Research meeting with Prof. Alfio Quarteroni on cohesive zone models for thermo-elasticity.

Workshops and sasonal schools attended

2022, Dec. **PRO3 Workshop on Scientific Computing**, *Lucca, Italy*
Presenter*: at the PRO3 joint programme project "Scientific computing for natural sciences, social sciences, and applications: methodological and technological development. A comprehensive characterization of fracture in unit cell open foams generated from Triply Periodic Minimal Surfaces.

2019, Oct. **Kick-off meeting PRIN 2017: XFAST-SIMS at Politecnico di Milano**, *Milan, Italy*
Presenter*: Recent advancements on computational methods for fluid-structure interaction: Lattice-Boltzmann and Smoothed Particle Hydrodynamics.

2015, July **Summer school SMI (Scuola Matematica Interuniversitaria)**, *Cortona, Italy*
Multiscale models for the cardiovascular system. Professors: Luca Formaggia (Politecnico di Milano), Christian Vergara (Politecnico di Milano).

2015, March **Euromech Colloquium 575**, *Lucca, Italy*
Contact Mechanics and Coupled Problems in Surface Phenomena.

Teaching experiences

2023 Lecturer of the course offered to the PhD in System Science, Cycle XXXVIII: **Advanced Topics of Computational Mechanics**, IMT School for Advanced Studies, Lucca, 20 hours.

2023 Lecturer of the course offered to the PhD in System Science and Management of Digital Transformation, Cycle XXXVIII: **Computational Contact and Fracture Mechanics**, IMT School for Advanced Studies, Lucca, 10 hours.

2022 Lecturer of the course offered to the PhD in Computer Science and Systems Engineering, Cycle XXXVII: **Advanced Topics of Computational Mechanics**, IMT School for Advanced Studies, Lucca, 15 hours.

2021 Lecturer of the course offered to the PhD in Computer Science and Systems Engineering, Cycle XXXVI: **Advanced Topics of Computational Mechanics**, IMT School for Advanced Studies, Lucca, 15 hours.

2020 Lecturer of the course offered to the PhD in Computer Science and Systems Engineering, Cycle XXXV: **Advanced Topics of Computational Mechanics**, IMT School for Advanced Studies, Lucca, 15 hours.

Istitutional activities

2022-2024 Supervisor of the PhD student René Thierry Djoumessi Cycle XXXVII in Systems Science, Track in Computational Mechanics, IMT School for Advanced Studies, Lucca

2021-2024 Supervisor of the PhD student Ajinkya Dusane Cycle XXXVI in Systems Science, Track in Computational Mechanics, IMT School for Advanced Studies, Lucca

2021-2022 Supervisor of the PhD student Deison Teixeira Preve Cycle XXXIV in Systems Science, Track in Computational Mechanics, IMT School for Advanced Studies, Lucca

2022 Member of the Selection Commettee for the PhD program Cycle XXXVIII at IMT Lucca in Systems Science.

2022 Member of the evaluation commettee for a Post Doctoral Fellow - Metodi computazionali ad alte prestazioni per la meccanica del contatto e della frattura at IMT Lucca

2021 Member of the Selection Commettee for the PhD program Cycle XXXVII at IMT Lucca in Computer Science and Systems Engineering (CSSE).

2021 Member of the evaluation committee for one Visiting professor position in "Dynamics of structures and material instabilities", research unit MUSAM (Multi-scale Analysis of Materials), at IMT Lucca.

2021 Member of the Selection Committee for one Post Doctoral Fellow position in "Meccanica computazionale per simulazioni ultra rapide ed accurate di sistemi strutturali complessi" financed project by PRIN 2017 "XFAST-SIMS: Extra fast and accurate simulation of complex structural systems" (codice MUR 20173C478N) - P0153, CUP: D68D19001260001.

2021-2023 Member of the evaluation Committee for one research collaborator in "Ricerca e sviluppo per materiali, dispositivi e processi della filiera dell'idrogeno". Joint research project between IMT, School for Advanced Studies Lucca and the Start-up Nemesys, innovative production of energy accumulators for sustainable mobility and massive storage.

Projects

2023-2027 Partecipation to the project for the project Marie Skłodowska-Curie Staff Exchanges (HORIZON-MSCA-2021-SE-01) "Ductility and Fracture Toughness analysis of functionally graded materials - DIAGONAL", granted by the European Research Executive Agency (GA 101086342), 184,000 Euro, 48 months (visiting period of 1 month planned at Northwestern University in 2024).

2022-2023 Participation to the project PRO3 "Scientific computing for natural sciences, social sciences, and applications: methodological and technological development". Joint project between IMT, SISSA, SNS, IUSS, GSSI, funded by MUR, PRO3 joint programme of the Italian Schools for Advanced Studies, 595,800 Euro, 24 months

2022-2024 Participation as member of the research group and co-supervisor of the post-doc of the project NEXTPAPER4.0 "Next Generation Paper and Packaging", Fondo per lo Sviluppo e la Coesione della Regione Toscana, 60,000 Euro, 24 months, in cooperazione con Lucense scarl.

2019-2023 Partecipation as a member of the Research Project of National Interest (PRIN 2017) "XFAST-SIMS: Extra fast and accurate simulation of complex structural systems", granted by the Italian Ministry of Education, University and Research (GA 20173C478N), 877,560 Euro, 36 months

2019 Participation as co-author to the project HSPHER9b: "High Performance Computing for SPHERA, Computational Fluid Dynamics - Smoothed Particle Hydrodynamics (CFD-SPH) research code for floods, landslides and wave motion, sediment removal from water reservoirs, sloshing tanks, hydrodynamic lubrication" granted by the CINECA Italian SuperComputing Resource Allocation (ISCRA class C) with a total amount of 280'000 cpu/hours on the supercomputer MARCONI .

2019 Participation to the project COMPACT: "A Computational framework to predict vascular transport and adhesion of circulating tumor cells in microfluidic chips", granted by the CINECA Italian SuperComputing Resource Allocation (ISCRA) with a total amount of 17.500 hours of computational time at supercomputer MARCONI.

2017-2019 Participation to the project: POTENT "Engineering Discoidal Polymeric Nanoconstructs for the Multi-Physics Treatment of Brain Tumors" (FP7/2007-2013)/ERC Consolidator Grant Agreement No. 616695

2014-2017 Participation to the project: "Multi-field and multi-scale Computational Approach to Design and Durability of PhotoVoltaic Modules" (FP/2007-2013)/ERC Starting Grant CA2PVM no. 306622

Technology transfer

2022-2024 Collaboration to the project NEXTPAPER4.0 "Next Generation Paper and Packaging", Fondo per lo Sviluppo e la Coesione della Regione Toscana, 60.000 Euro, 24 months, in cooperazione con Lucense scarl (Lucca).

2022-2024 Collaboration founded by the Italian recovery plan PNRR with SIGMA INGEGNERIA SRL unipesonale and San Luca Hospital (Lucca) for the project: "Exploring a novel 3-D in vivo bioprinting technology inside the gastrointestinal system: perspectives and new frontiers".

Honors and awards

2018 **Best Ph.D thesis award Gruppo Meccanica dei Materiali (GMA)** dell' Associazione di Meccanica Teorica ed Applicata for the thesis: "Modeling and Simulation of a Class of Nonlinear Coupled Reaction-Diffusion Problems for Green Applications".

Affiliations

AIMETA 2017-2023 Socio AIMETA Associazione Italiana di Meccanica Teorica e Applicata.

GIMC-GMA 2017-2023 Gruppo Italiano di Meccanica Computazionale-Gruppo Materiali AIMETA.

GNFM 2017-2018 Gruppo Nazionale per la Fisica Matematica (Istituto Nazionale di Alta Matematica–INdAM).

Languages

Italian Native

English Excellent

Programming languages

Programming MATLAB, Fortran, FEAP, C++, FreeFem++, ESPResSo, Python Object-in-fluid, FEniCS, Python

Operating systems Linux, Ubuntu, Windows

Other tools LaTeX