

MATTEO PEZZULLA

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DATE OF BIRTH: August 3, 1988

CITIZENSHIP: Italian

SUMMARY OF QUALIFICATIONS & ASSETS

I am a Postdoctoral Associate in the flexLab at EPFL.

My current research involves aspects of fluid-structure interactions relevant to the understanding of the behavior of porous wings at low Reynolds numbers. I also keep an interest on the theoretical and applied mechanics of thin shells. I work among solid mechanics, fluid mechanics, and differential geometry and I am interested in analytical, numerical, and experimental methods.

I am a member of the Italian Research Group in Mathematical Physics (GNFM) and the American Physical Society (APS).

EXPERIENCE

Nov 2017 – currently POSTDOCTORAL ASSOCIATE at École Polytechnique Fédérale de Lausanne
Supervisor: Prof. Pedro M. REIS

Nov 2015 – Oct 2017 POSTDOCTORAL ASSOCIATE at Boston University
Supervisor: Prof. Douglas P. HOLMES

EDUCATION

FEBRUARY 2016 Ph.D. in THEORETICAL AND APPLIED MECHANICS,
Sapienza - Università di Roma
with honors
Focus: Morphing of Thin Soft Structures Driven by Geometry and Swelling
Advisor: Prof. Paola NARDINOCCHI

Aug – Dec 2014 Visiting Scholar at Boston University
Advisor: Prof. Douglas P. HOLMES

OCTOBER 2012 M.Sc. in SPACE ENGINEERING, Sapienza - Università di Roma
110/110 cum laude
Thesis: “On the control of the large deformations occurring in IPMCs”
Advisor: Prof. Paola NARDINOCCHI

OCTOBER 2010 B.Sc. in AEROSPACE ENGINEERING, Sapienza - Università di Roma
110/110 cum laude
Thesis: “Bending deformations in ionic polymer metal composites induced by mechano-electro-chemical interactions”
Advisor: Prof. Paola NARDINOCCHI

TALKS, PRESENTATIONS & POSTERS

- 2018 [M. Pezulla](#), E. Strong, H. Karimi, and P. M. Reis. “[Deformation of perforated elastic sheets due to the hydrodynamic loading by a viscous fluid](#)” at ESMC 2018, Bologna, Italy, July, 2–6.
- 2018 [M. Pezulla](#), E. Strong, H. Karimi, and P. M. Reis. “[Deformation of perforated elastic sheets due to the hydrodynamic loading by a viscous fluid](#)” at APS March Meeting 2018, Los Angeles, California, USA, March, 5–9.
- 2018 D. Yan, A. Lee, [M. Pezulla](#), F. Lopez Jimenez, J. Marthelot, D. P. Holmes, and P. M. Reis. “[For Better or For Worse: Self-tuning of the buckling strength of active bilayer shells](#)” at APS March Meeting 2018, Los Angeles, California, USA, March, 5–9.
- 2017 [M. Pezulla](#), N. Stoop, M. Steranka, A. Bade, M. Trejo, and D. P. Holmes. “[Global Curvature Buckling and Snapping of Spherical Shells](#)” at APS March Meeting 2017, New Orleans, Louisiana, USA, March, 13–17.
- 2016 [M. Pezulla](#) and D. P. Holmes. “[Geometry and Instabilities in Growing Shells](#)” at NEW.Mech 2016, Harvard University, USA, October, 22.
- 2016 [M. Pezulla](#) and D. P. Holmes. “[Morphing and Instabilities of Growing Sheets](#)” at PHASME 2016, Cargese, Corsica, August, 8–20.
- 2016 [M. Pezulla](#), G. P. Smith, P. Nardinocchi, and D. P. Holmes. “[Geometry and Mechanics of Thin Growing Bilayers](#)” at APS March Meeting 2016, Baltimore, Maryland, USA, March, 13–18.
- 2015 D. P. Holmes, [M. Pezulla](#), P. Nardinocchi, and S. A. Shillig. “[Morphing and snapping of plates and shells via swelling](#)” at APS March Meeting 2015, San Antonio, Texas, USA, March, 2–6.
- 2014 [M. Pezulla](#), S. A. Shillig, P. Nardinocchi, and D. P. Holmes. “[Morphing of geometric composites via residual swelling](#)” at 61st New England Complex Fluids Meeting, Harvard University, USA, December, 5.
- 2014 P. Nardinocchi, [M. Pezulla](#) and L. Teresi. “[Anisotropic swelling of thin gel films](#)” at NEW.Mech 2014, University of Massachusetts Amherst, USA, October, 18.
- 2014 P. Nardinocchi, [M. Pezulla](#) and L. Teresi. “[Anisotropic swelling in fibrous materials](#)” at the 17th U.S. National Congress on Theoretical and Applied Mechanics, Michigan State University, USA, June, 15–20.
- 2013 A. Lucantonio, P. Nardinocchi, [M. Pezulla](#) and L. Teresi. “[Electromechanical model and motion control of soft bio-hybrid systems](#)” at the INdAM Meeting “The Mathematics of Cells and Tissues”, Cortona, Italy, September, 2–6.
- 2013 A. Lucantonio, P. Nardinocchi, [M. Pezulla](#), V. Pugliese and L. Teresi. “[Modeling Tools for Soft Robotics](#)” at the Soft Robotic Conference, Ascona, Switzerland, July (Poster).
- 2013 Y. Cha, P. Nardinocchi, [M. Pezulla](#) and M. Porfiri. “[Giant displacement in IPMC-based structures: a preliminary study](#)” at the 6th ECCOMAS Thematic Conference on Smart Structures and Materials (SMART2013), Torino, Italy, June, 24–26.

INVITED SEMINARS

- 2016 [Geometry and Instabilities in Growing Shells](#). Sapienza - Università di Roma, Rome, Italy, December.
- 2016 [Geometry and Instabilities in Growing Shells](#). Physical Mathematics Seminar, MIT, Cambridge, MA, October
- 2015 [Morphing of geometric composites](#). Form Finding Workshop, Roma Tre University, Rome, Italy, April.
- 2014 [Morphing of Geometric Composites via Residual Swelling](#). Bertoldi Group Meeting, Harvard University, Cambridge, MA, December.

SUBMITTED PUBLICATIONS OR PUBLICATIONS IN PREPARATION

- 2018 D. P. Holmes and M. Pezzulla. [A Stress-Diffusion Model for Residual Swelling](#). *In preparation*
- 2018 P. Costa, M. Pezzulla and D. P. Holmes. [Curvature Buckling of Constrained Shells](#). *In preparation*
- 2018 D. P. Holmes, J.-H. Lee, H. S. Park, and M. Pezzulla. [The nonlinear buckling behavior of a complete spherical shell under uniform external pressure and homogenous natural curvature](#). *In preparation*

JOURNALS & CONFERENCE PROCEEDINGS

* Papers with alphabetical ordering of authors in which I gave a *first author* contribution.

- 2018 X. Jiang, M. Pezzulla, S. Wei, T. K. Ghosh, and D. P. Holmes. [Snapping of Bistable, Prestressed Cylindrical Shells](#). *Europhys. Lett.* 122, 64003, (2018)
- 2018 M. Pezzulla, N. Stoop, M. P. Steranka, A. J. Bade, and D. P. Holmes. [Curvature-Induced Instabilities of Shells](#). *Phys. Rev. Lett.* 120, 048002, (2018)
- 2017 M. Pezzulla, N. Stoop, X. Jiang, and D. P. Holmes. [Curvature-Driven Morphing of Non-Euclidean Shells](#). *Proc. R. Soc. A* 473(2201), 20170087, (2017)
- 2016 M. Pezzulla, G. P. Smith, P. Nardinocchi, and D. P. Holmes. [Geometry and Mechanics of Thin Growing Bilayers](#). *Soft Matter* 12, 4435-4442, (2016)
- 2015 P. Nardinocchi, M. Pezzulla, and L. Teresi. [Steady and transient analysis of anisotropic swelling in fibered gels](#). *J. Appl. Phys.* 118, 244904, (2015)
- 2015 M. Pezzulla, S. A. Shillig, P. Nardinocchi, and D. P. Holmes. [Morphing of geometric composites via residual swelling](#). *Soft Matter* 11, 5812-5820, (2015) [Inside Front Cover]
- 2015 *P. Nardinocchi, M. Pezzulla, and L. Teresi, [Mechanics of bio-hybrid systems](#). *Procedia IUTAM* 12, pp. 145-153, (2015)
- 2015 *P. Nardinocchi, M. Pezzulla, and L. Teresi, [Anisotropic swelling of thin gel sheets](#). *Soft Matter* 11, 1492-1499, (2015)
- 2014 A. Lucantonio, P. Nardinocchi, and M. Pezzulla. [Swelling-induced and controlled curving in layered gel beams](#). *Proc. R. Soc. A* 470(2171), 20140467, (2014)
- 2014 *A. Lucantonio, P. Nardinocchi, M. Pezzulla, and L. Teresi. [Multiphysics of bio-hybrid systems: shape control and electro-induced motion](#). *Smart Mater. Struct.* 23(4), 045043, (2014)
- 2014 P. Nardinocchi, M. Pezzulla, B.J. Akle, M. Guenther, and T. Wallmersperger. [Actuation and buckling effects in IPMCs](#). *Proc. SPIE* 9056, (2014)
- 2013 Y. Cha, P. Nardinocchi, M. Pezzulla, and M. Porfiri. [Giant displacements in IPMC-based structures: a preliminary study](#). *Adv. Mat. Res.* 745, 119-128, (2013)
- 2013 *P. Nardinocchi and M. Pezzulla. [Curled actuated shapes of ionic polymer metal composites](#). *J. Appl. Phys.* 113, 224906, (2013)
- 2011 *P. Nardinocchi, M. Pezzulla, and L. Placidi. [Thermodynamically based multiphysic modeling of ionic polymer metal composites](#). *J. Intel. Mat. Syst. Str.* 22(16), 1887-1897, (2011)

HONORS

2016	PHASME 2016 Travel Grant, ICAM (USD 1K),
2014	Research Project Grant <i>Giovani Ricercatori</i> , INdAM (€ 1.6K), “Corrugamento di travi bistrato di gel polimerico”
2014	Research Project Young Investigator Grant, Sapienza University (€ 2K), “Shaping of bio-hybrid systems: reduced models and numerical simulations”
2013–2015	Graduate Research Fellowship, Italian Ministry of Education
2012	ADISU M.Sc. degree award
2010	ADISU B.Sc. degree award
2007–2012	ADISU scholarship

TEACHING AND SERVICE

2017	Guest Lecture on the Buckling of Columns for the class on <i>Mechanics of Materials</i> Boston University, Instructor: Prof. Harold S. Park
2015-2017	Reviewer for <i>Journal of Intelligent Materials Systems and Structures</i> , <i>Journal of Applied Mechanics</i> , <i>Proceedings of the Royal Society A</i>
2015	Teaching Assistant for the class on <i>Mechanics of Solids and Structures</i> (Instructor: Prof. P. Nardinocchi)
2012–2015	Co–advisor for bachelor theses in Aerospace Engineering and master theses in Aeronautical Engineering (Advisor: Prof. P. Nardinocchi)

MENTORING

Michele Curatolo	Ph.D. Student in Mechanical Engineering, Roma Tre University <i>Adhesion and Swelling of an Elastica</i>
Paul Costa	Master Student in Mechanical Engineering, École Polytechnique <i>Curvature Buckling of Constrained Shells</i>
Lucia Stein-Montalvo	Ph.D. Student in Mechanical Engineering, Boston University <i>Theory and Numerical Simulations on Plates and Shells</i>
Xin Jiang	Ph.D. Student in Mechanical Engineering, Boston University <i>Theory and Numerical Simulations on Plates and Shells</i>
Jay Shunter	Ph.D. Student in Mechanical Engineering, Boston University <i>Differential Geometry and the Elastica</i>
Mark Steranka	Undergraduate Student in Mechanical Engineering, Boston University <i>Experiments on Spherical Snapping Bilayer Shells</i>
Abdikhalaq Bade	Undergraduate Student in Mechanical Engineering, Boston University <i>Experiments on Spherical Buckling Bilayer Shells and setup of a 3D scanner</i>
Eric Fu	High School Student - RISE program <i>Fabrication of Conical Bilayer Shells and Realization of an Experimental Setup for Image Processing</i>
Marco Rossi	Master Student in Aeronautical Engineering, Sapienza - Università di Roma <i>Numerical, Analytical and Experimental investigation on Ionic Polymer Metal Composites</i>

Lorenzo Teofili	Master Student in Space Engineering, Sapienza - Università di Roma <i>Motion Control Analysis Of a Bio-Hybrid Actuator</i>
Andrea Pitzalis	Undergraduate Student in Aerospace Engineering, Sapienza - Università di Roma <i>Material Characteristics of IPMCs: Calibration Tests</i>
Francesco Saltari	Undergraduate Student in Aerospace Engineering, Sapienza - Università di Roma <i>Bending Modes in IPMCs Induced by Non Homogeneous Differences in Voltage</i>
Giulia Murzilli	Undergraduate Student in Aerospace Engineering, Sapienza - Università di Roma <i>An Analytical Model for Bio-hybrid Beams</i>
Virginia Notaro	Undergraduate Student in Aerospace Engineering, Sapienza - Università di Roma <i>Nonlinear Analytical Modeling of Buckling in IPMCs</i>

LANGUAGE & PROGRAMMING SKILLS

- ★ Mother tongue: italian. Fluent in english. Intermediate knowledge of spanish and french.
- ★ Experience programming in C, Fortran, and Python.
- ★ Experience with mathematical software such as Matlab, Mathematica, LabView, \LaTeX .
- ★ Experience with FE software such as COMSOL Multiphysics, ADINA, Nastran.
- ★ Experience with Adobe Illustrator, Blender, MeshLab, Paraview and ImageJ.

REFERENCES

- ★ Douglas P. Holmes, *Boston University*, Boston, USA (dpholmes@bu.edu)
- ★ Paola Nardinocchi, *Sapienza - Università di Roma*, Roma, Italy (paola.nardinocchi@uniroma1.it)
- ★ Pedro M. Reis, *EPFL*, Lausanne, Switzerland (pedro.reis@epfl.ch)
- ★ Luciano Teresi, *Università di Roma Tre*, Roma, Italy (teresi@uniroma3.it)



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