MATTEO PEZZULLA
AU

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Date of Birth: August 3, 1988
Citizenship: Italian

Summary of qualifications & assets

I am an Assistant Professor in the Department of Mechanical Engineering at Aarhus University.

My current research involves aspects of fluid-structure interactions and 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 American Physical Society (APS).

Experience

Nov 2020 – currently	Tenure Track Assistant Professor at Aarhus University
Nov 2017 – Oct 2020	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

Invited Seminars

2022 Morphing of slender structures via elastic instabilities. CITA, Copenhagen, Denmark, March.

2021 A Geometrically Exact Model for Thin Magneto-elastic Shells. Sapienza University of Rome, Rome, Italy, September.

2020 Towards Fluid-Shells Interactions. Aarhus University, Aarhus, Denmark, April.

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

2022 P. G. Ledda, M. Pezzulla, E. Jambon-Puillet, P.-T. Brun, and F. Gallaire. Gravity-driven coatings on curved substrates: a differential geometry approach. *Submitted*. Available at arXiv:2202.11470

2021 M. Pezzulla, D. Yan, and P. M. Reis. A geometrically exact model for thin magneto-elastic shells. *Submitted*. Available at arXiv:2111.02145

2021 P. Leroy-Catalayud, M. Pezzulla, A. Keiser, K. Mulleners, and P. M. Reis. Tapered foils favor traveling-wave kinematics to enhance the performance of flapping propulsion. *Submitted*

Journals & Conference Proceedings

2022 T. G. Sano, M. Pezzulla, and P. M. Reis. A Kirchhoff-like theory for hard magnetic rods under three-dimensional geometrically nonlinear deformation. *J. Mech. Phys. Solids* 160, 104739 (2022).

2021 B. Shrimali, M. Pezzulla, S. Poincloux, P. M. Reis, and O. Lopez-Pamies. The remarkable bending properties of perforated plates. *J. Mech. Phys. Solids* 154, 104514 (2021).

2021 D. Yan, M. Pezzulla, L. Cruveiller, A. Abbasi, and P. M. Reis. Magneto-active elastic shells with tunable buckling strength. *Nat. Commun.* 12, 2831 (2021).

2020 M. Pezzulla, E. F. Strong, F. Gallaire, and P. M. Reis. Deformation of porous flexible strip in low and moderate Reynolds number flows. *Phys. Rev. Fluids* 5, 084103 (2020)

2020 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. *Phys. Rev. E* 102, 023003 (2020)

2020 D. Yan, M. Pezzulla, and P. M. Reis. Buckling of pressurized spherical shells containing a through-thickness defect. *J. Mech. Phys. Solids* 138, 103923 (2020)

2019 M. Pezzulla and P. M. Reis. A Weak Form Implementation of Nonlinear Axisymmetric Shell Equations with Examples. *ASME. J. Appl. Mech.* 86(12): 124502, (2019)

2019 E. F. Strong, M. Pezzulla, F. Gallaire, P. M. Reis, and L. Siconolfi. Hydrodynamic loading of perforated disks in creeping flows. *Phys. Rev. Fluids* 4, 084101, (2019)

2019 A. Lee, D. Yan, M. Pezzulla, D. P. Holmes, and P. M. Reis. Evolution of critical buckling conditions in imperfect bilayer shells through residual swelling. *Soft Matter* 15, 6134-6144, (2019)

2019 L. Stein-Montalvo, P. Costa, M. Pezzulla and D. P. Holmes. Buckling of Geometrically Confined Shells. *Soft Matter* 15, 1215-1222, (2019)

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 *Giovani Ricercatori*, 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

2021-	Courses: *Beams and plates*, *Theory of Elasticity* AU, Instructor
2019	Lectures on shells for the class on *Mechanics of Slender Structures* EPFL, Instructor: Prof. Pedro M. Reis
2017	Guest Lecture on the Buckling of Columns for the class on *Mechanics of Materials* Boston University, Instructor: Prof. Harold S. Park
2015-2019	Reviewer for *Journal of Intelligent Materials Systems and Structures*, *Journal of Applied Mechanics, Proceedings of the Royal Society A*, *International Journal of Solids and Structures*, *Soft Matter*
2015	Teaching Assistant for the class on *Mechanics of Solids and Structures* (Instructor: Prof. P. Nardinocchi)
2012–2015	Co–advisor for bachelor theses in Aerospace Engineering and master theses in Aeronautical Engineering (Advisor: Prof. P. Nardinocchi)

Language & Programming Skills

⋆ Mother tongue: Italian. Fluent in English. C2 in French. B2 in Spanish. B1 in Danish.

⋆ 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.

March, 2022