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Paolo PIERSANTI

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Personal Information

Place and year of birth Umbertide (Italy), 1990

Nationality Italian

Address Department of Mathematics, Indiana University, Bloomington, IN, USA

Languages Italian (Native speaker), English (Fluent, IELTS Academic Certificate Level C 1)

Employment

12/2020 - 05/2024 **Zorn Postdoctoral Fellow**, *Indiana University*, Bloomington, IN, USA
Mentor: Distinguished Professor Roger M. TEMAM.

Short Term Positions

07/2019 - 11/2020 **Postdoctoral Fellow**, *Karl-Franzens-Universität Graz*, Graz, Austria

08/2015 - 06/2016 **Research Associate**, *City University of Hong Kong*, Hong Kong S.A.R., China

Visiting Positions

05/22/2018 – 06/20/2018 **Research Associate**, *Department of Applied Mathematics of Xi'an University of Technology*, China

Academic Certifications

28/11/2023 - 28/11/2034 **National Scientific Qualification**, *National Scientific qualification as Associate Professor in the Italian higher education system, in the call 2021/2023 for the disciplinary field of 01/A3 - Mathematical analysis, probability and statistics.*

Education

09/2016 - 07/2019 **Ph.D. in Mathematics**, *City University of Hong Kong*, Hong Kong S.A.R., China
Degree date: 15/7/2019.
Thesis title: Obstacle Problems in Linearised Elasticity
Advisor: Emeritus Professor Philippe G. CIARLET.

2012 - 2014 **Master's Degree in Mathematics**, *University of Perugia*, Perugia, Italy, Final Grade: 110/110 *Summa Cum Laude*
Degree date: 28/11/2014.
Thesis title: Variational methods for nonlocal elliptic Dirichlet problems.
Advisor: Emeritus Professor Patrizia PUCCI.

2009 - 2012 **Bachelor's Degree in Mathematics**, *University of Perugia*, Perugia, Italy, Final Grade: 110/110 *Summa Cum Laude*
Degree date: 30/11/2012.
Thesis title: The elastic pendulum in two and three dimensions theory and its applications (written in Italian).

2004 - 2009 **High School Diploma**, *Scientific High School "Galileo Galilei"*, Perugia, Italy, Final Grade: 100/100

Scholarships

08/2018 - 07/2019 **Research Tuition Scholarship**, *Scholarship awarded by City University of Hong Kong to waive meritful students from paying the annual tuition fee*

08/2017 - 07/2018 **Research Tuition Scholarship**, *Scholarship awarded by City University of Hong Kong to waive meritful students from paying the annual tuition fee*

09/2016 - 08/2017 **Chow Yei Ching Entrance Scholarship**, *Scholarship awarded by City University of Hong Kong to pursue Ph.D. studies*

09/2016 - 07/2019 **Hong Kong Ph.D. Fellowship Scheme**, *Grant awarded by the Hong Kong S.A.R. Government to pursue Ph.D. studies*

Awards

05/2020 **The Hong Kong Mathematical Society Best Thesis Award 2020**, *Cash prize awarded by the Hong Kong Mathematical Society in recognition of Ph.D. students in Mathematics who have produced a thesis of outstanding quality and achievement*

09/2019 **Outstanding Research Thesis Award**, *Cash prize awarded by City University of Hong Kong in recognition of research students who have produced a thesis of outstanding quality and achievement in their relevant research area*

08/2018 **Outstanding Academic Performance Award**, *Cash prize awarded by City University of Hong Kong in recognition of outstanding academic performance*

08/2017 **Outstanding Academic Performance Award**, *Cash prize awarded by City University of Hong Kong in recognition of outstanding academic performance*

Research Grants

08/2022- 09/2023 **Ky and Yu-Fen Fan Fund Travel Grant from the AMS**, *Grant awarded by the American Mathematical Society to foster the collaboration between U.S. based institutions and China based institutions*
Role: Principal Investigator
Amount: 6,700 USD
Starting Date: 08/2022

Research Interests

- Applied Functional Analysis
- Differential Geometry
- Numerical Analysis
- Numerical Optimization
- Partial Differential Equations
- Calculus of Variations
- Mathematical Biology
- Mathematical Elasticity

- Mathematical Glaciology
- Deep Learning in PDE's

Publications

21. X. Peng, P. Piersanti and X. Shen. Numerical approximation of the solution of Koiter's model for an elliptic membrane shell subjected to an obstacle via the penalty method. *Submitted* Link to Pre-Print
20. A. Meixner and P. Piersanti. Numerical approximation of the solution of an obstacle problem modelling the displacement of elliptic membrane shells via the penalty method. *Appl. Math. Optim.*, **89**, article 45, 2024
19. P. Piersanti. Asymptotic analysis of linearly elastic flexural shells subjected to an obstacle in absence of friction. *J. Nonlinear Sci.*, **33**(4), pp. 39, 2023
18. W. Duan, P. Piersanti, X. Shen and Q. Yang. Numerical corroboration of Koiter's model for all the main types of linearly elastic shells in the static case. *Math. Mech. Solids*, **28**(11), 2347–2369, 2023
17. P. Piersanti and R. Temam. On the dynamics of grounded shallow ice sheets: Modeling and analysis. *Adv. Nonlinear Anal.*, **12**(1), pp. 40, 2023
16. P. Piersanti, K. White, B. Dragnea and R. Temam. A three-dimensional discrete model for approximating the deformation of a viral capsid subjected to lying over a flat surface in the static and time-dependent case. *Anal. Appl.*, **20**(6), 1159–1191, 2022
15. P. Piersanti, K. White, B. Dragnea and R. Temam. Modelling virus contact mechanics under atomic force imaging conditions. *Applicable Anal.*, **101**(11), 3947–3957, 2022
14. P. Piersanti. Asymptotic analysis of linearly elastic elliptic membrane shells subjected to an obstacle. *J. Differential Equations*, **320**, 114–142, 2022
13. P. Piersanti. On the improved interior regularity of a boundary value problem modelling the displacement of a linearly elastic elliptic membrane shell subject to an obstacle. *Discrete Contin. Dyn. Syst. Ser. A*, **42**(2), 1011–1032, 2022
12. P. Piersanti. On the improved interior regularity of the solution of a fourth order elliptic problem modelling the displacement of a linearly elastic shallow shell lying subject to an obstacle. *Asymptot. Anal.*, **127**(1–2), 35–55, 2022
11. P. Piersanti. On the justification of the frictionless time-dependent Koiter's model for thermoelastic shells. *J. Differential Equations*, **296**, 50–106, 2021
10. P. Piersanti and X. Shen. Numerical methods for static shallow shells lying over an obstacle. *Numer. Algorithms*, **85**(2), 623–652, 2020
9. X. Shen, L. Piersanti and P. Piersanti. Numerical simulations for the dynamics of flexural shells, *Math. Mech. Solids*, **25**(4), 887–912, 2020
8. P. Piersanti. A time-dependent obstacle problem in linearised elasticity. *Nonlinear Anal.*, **192**, 17 pp., 2020.
7. P. Piersanti. An existence and uniqueness theorem for the dynamics of flexural shells. *Math. Mech. Solids*, **25**(2), 317–336, 2020
6. P. G. Ciarlet and P. Piersanti. An obstacle problem for Koiter's shells. *Math. Mech. Solids*, **24**(10), 3061–3079, 2019.
5. P. G. Ciarlet, C. Mardare and P. Piersanti. An obstacle problem for elliptic membrane shells. *Math. Mech. Solids*, **24**(5), 1503–1529, 2019.

4. P. G. Ciarlet and P. Piersanti. A confinement problem for a linearly elastic Koiter's shell. *C.R. Acad. Sci. Paris, Ser. I*, **357**(2), 221–230, 2019.
3. P. G. Ciarlet, C. Mardare and P. Piersanti. Un problème de confinement pour une coque membranaire linéairement élastique de type elliptique. (French). *C.R. Acad. Sci. Paris, Ser. I*, **356**(10), 1040–1051, 2018.
2. P. Piersanti and P. Pucci. Entire solutions for critical p-fractional Hardy Schrödinger Kirchhoff equations. *Publ. Mat.*, **62**(1), 3–36, 2018.
1. P. Piersanti and P. Pucci. Existence theorems for fractional p-Laplacian problems. *Anal. Appl.*, **15**(5), 607–640, 2017.

Invitations at International Conferences

20–24 May 2024 **The Third Emerging Trends in Applied Mathematics and Mechanics**, **A Coruña**, **Spain**
Invited Plenary Speaker

6–8 October 2023 **The 8th Annual Meeting of SIAM Central States Section**, **Lincoln, NE**, **USA**

31 May–4 June 2023 **The 13$^{\text{th}}$ AIMS Conference on Dynamical Systems, Differential Equations and Applications**, **Wilmington, NC**, **USA**

1–2 October 2022 **The 7th Annual Meeting of SIAM Central States Section**, **Stillwater, OK**, **USA**

20–24 June 2022 **Summer School in Nonlinear Analysis (Pucci's Day)**, **Viterbo**, **Italy**

26–27 May 2022 **The 2022 Midwest Dynamical Systems Early Career Conference**, **South Bend, IN**, **USA**

3–5 February 2020 **Workshop on Nonlinear PDEs and Applications on the occasion of the retirement of Professor Maria Cesarina Salvatori**, **Perugia**, **Italy**

17–19 December 2019 **FreeFEM Days 2019**

5 December 2019 **Satellite Workshop of The 26$^{\text{th}}$ International Conference on Domain Decomposition**, **Hong Kong**, **Hong Kong S.A.R.**, **China**

25–27 November 2019 **Workshop on Nonsmooth Optimisation**, **Linz**, **Austria**

20–24 May 2019 **International Conference on Elliptic and Parabolic Problems**, **Gaeta**, **Italy**

5–9 July 2018 **The 12$^{\text{th}}$ AIMS Conference on Dynamical Systems, Differential Equations and Applications**, **Taipei**, **Taiwan**

22–26 May 2017 **International Conference on Elliptic and Parabolic Problems**, **Gaeta**, **Italy**

Lectures and colloquia

14 December 2023 **City University of New York, Hunter College**, New York, NY, USA
Held Online

6 December 2023 **SISSA**, Trieste, Italy
Held Online

2 November 2023 **The University of Memphis**, Memphis, TN, USA

17 October 2023 **The National Sun Yat-Sen University**, Kaohsiung, Taiwan
Held Online

25 September 2023 **The Chinese University of Hong Kong Shenzhen**, Shenzhen, China
Held Online

22 September 2023 **The University of Alabama**, Tuscaloosa, AL, USA
Held Online

28 June 2023 **Polytechnic of Milan**, Milan, Italy

23 January 2023 **Indiana University**, Bloomington, IN, USA

11 January 2023 **City University of Hong Kong**, Hong Kong, Hong Kong S.A.R. of China
Held Online

12 September 2022 **Indiana University**, Bloomington, IN, USA

7 February 2022 **University of Illinois Chicago**, Chicago, IL, USA
Held online

11 October 2021 **Indiana University**, Bloomington, IN, USA

20 May 2021 **Xi'an University of Technology**, Xi'an, China
Held online

8 February 2021 **Indiana University**, Bloomington, IN, USA
Held online

11 December 2020 **University of Perugia**, Perugia, Italy
Held online

20 November 2019 **University of Klagenfurt**, Klagenfurt, Austria

14 November 2019 **Technical University of Graz**, Graz, Austria

27 June 2019 **University of Trento**, Trento, Italy

7 June 2018 **Xi'an University of Technology**, Xi'an, China

Other Academic Activities

Departmental Service

2023 - 2024 **Co-Leader of the Reading Course "Deep Learning and Physics Informed Neural Networks"**, *Indiana University*, Bloomington, IN, USA
Co-led with Distinguished Professor Kevin R. Zumbrun (Indiana University Bloomington)

2022 - 2023 **Member of the Organizing Committee of the Indiana University Colloquia in Mathematics**, *Indiana University*, Bloomington, IN, USA

2022 **Mentor for the Research Experience for Undergraduates**, *Indiana University*, Bloomington, IN, USA
Mentee: Aaron Meixner (The Ohio State University)

2021 - 2022 **Member of the Organizing Committee of the Indiana University Colloquia in Mathematics**, *Indiana University*, Bloomington, IN, USA

Organisation of Conferences and Mini-Symposia

20–24 May 2024 **Co-Organiser of the Mini-Symposium *New Results in Asymptotic Analysis of Elastic and Viscoelastic Shells***, *The Third Emerging Trends in Applied Mathematics and Mechanics*, A Coruña, Spain
Co-organised with Professor Ángel Arós (University of A Coruña, Spain)

23 – 26 July 2024 **Co-Organiser of the Mini-Symposium *PDEs Applications to Nonlinear Phenomena***, *Second Joint Meeting between the American Mathematical Society and the Italian Mathematical Union*, Palermo, Italy
Co-organised with Emeritus Professor Patrizia Pucci (University of Perugia, Italy)

Reviews for Scientific Journals and Books

Philosophical Transactions of the Royal Society A, *since 2024*, (1) paper

Communications in Nonlinear Science and Numerical Simulation, *since 2023*, (1) paper

Discrete and Continuous Dynamical Systems. Series A, *since 2023*, (2) paper

Mathematics and Mechanics of Solids (Math. Mech. Solids), *since 2023*, (3) papers

Nonlinearity, *since 2023*, (1) paper

Advances in Nonlinear Analysis (Adv. Nonlinear Anal.), *since 2022*, (1) paper

Discrete and Continuous Dynamical Systems. Series S, *since 2022*, (1) paper

Journal of Elasticity (J. Elasticity), *since 2021*, (1) paper

Nature Physics (Nat. Phys.), *since 2021*, (2) papers

The Indiana University Mathematics Journal (IUMJ), *since 2020*, (1) paper

Applicable Analysis (Appl. Anal.), *since 2019*, (4) papers

Students Supervision and Co-Supervision

Ph.D. Students

2021-present **Wangxi DUAN**, *Xi'an University of Technology*, Xi'an, Shaanxi, China, Ph.D. candidate
Co-supervised with Professor Xiaoqin Shen, Xi'an University of Technology, China

M.Sc. Students

2022-present **Xin PENG**, *Xi'an University of Technology*, Xi'an, Shaanxi, China, M.Sc. candidate
Co-supervised with Professor Xiaoqin Shen, Xi'an University of Technology, China

Teaching

Spring 2024 **Instructor M 472 – Numerical Analysis II**, *Indiana University*, Bloomington, IN, USA
Direct and Iterative methods for solving linear systems. Elements of Nonlinear Optimization. Elements of Deep Learning.

Fall 2023 **Instructor M 211 – Calculus I**, *Indiana University*, Bloomington, IN, USA
Introduction to differential calculus.

Fall 2023 **Instructor M 471 – Numerical Analysis I**, *Indiana University*, Bloomington, IN, USA
Machine numbers. Polynomial interpolation. Numerical differentiation and integration. Euler's method. Runge-Kutta method.

Spring 2023 **Instructor M 540 – Partial Differential Equations I**, *Indiana University*, Bloomington, IN, USA
Introduction to PDE's. Elliptic, parabolic and hyperbolic PDE's. Energy methods. This is a graduate-level course.

Spring 2023 **Instructor M/S 344 – Ordinary Differential Equations II**, *Indiana University*, Bloomington, IN, USA
Systems of ordinary differential equations. Stability.

Fall 2022 **Instructor M/S 343 – Ordinary Differential Equations I**, *Indiana University*, Bloomington, IN, USA
Basic methods for solving ordinary differential equations.

Spring 2022 **Instructor M 371 – Elementary Computational Methods**, *Indiana University*, Bloomington, IN, USA
Machine numbers, numerical computation of roots of equations, numerical methods for solving linear systems, interpolating polynomials, numerical integration and numerical methods for solving differential equations.

Spring 2022 **Instructor M/S 344 – Ordinary Differential Equations II**, *Indiana University*, Bloomington, IN, USA
Systems of ordinary differential equations. Stability.

Fall 2021 **Instructor M 211 – Calculus I**, *Indiana University*, Bloomington, IN, USA
Introduction to differential calculus (two sections taught).

Spring 2021 **Instructor M/S 344 – Ordinary Differential Equations II**, *Indiana University*, Bloomington, IN, USA
Systems of ordinary differential equations. Stability.

Spring 2018 **Teaching Assistant MA1201 – Calculus and basic Linear Algebra II**, *City University of Hong Kong*, Hong Kong
Integration, complex numbers, vectors.

Spring 2018 **Teaching Assistant MA8005 – Advanced Partial Differential Equations I**, *City University of Hong Kong*, Hong Kong
Sobolev spaces and elliptic PDEs.

Fall 2018 **Teaching Assistant MA8006 – Functional Analysis and Applications**, *City University of Hong Kong*, Hong Kong
Banach spaces, Hilbert spaces, Projection theorem, Banach fixed point theorem, Baire's theorem, Hahn-Banach theorem and weak convergence.

Fall 2018 **Teaching Assistant MA0102 – Basic Engineering Mathematics II**, *City University of Hong Kong*, Hong Kong
Linear algebra, ordinary differential equations, Laplace transform and Fourier series.

Spring 2018 **Teaching Assistant MA0101 – Basic Engineering Mathematics I**, *City University of Hong Kong*, Hong Kong
Vector calculus, differentiation and integration techniques.

Spring 2018 **Teaching Assistant MA3515 – Optimization**, *City University of Hong Kong*, Hong Kong
Linear programming and simplex algorithm.

Spring 2018 **Teaching Assistant MA1005 – Arts and Mathematics**, *City University of Hong Kong*, Hong Kong
Basic mathematical concepts and techniques that artists have used such as symmetry, conics and polyhedra, perspective, and projective geometry.

Fall 2017 **Teaching Assistant MA8006 – Functional Analysis and Applications**, *City University of Hong Kong*, Hong Kong
Banach spaces, Hilbert spaces, Projection theorem, Banach fixed point theorem, Baire's theorem, Hahn-Banach theorem and weak convergence.

Fall 2017 **Teaching Assistant MA0102 – Basic Engineering Mathematics II**, *City University of Hong Kong*, Hong Kong
Linear algebra, ordinary differential equations, Laplace transform and Fourier series.

Spring 2017 **Teaching Assistant MA0101 – Basic Engineering Mathematics I**, *City University of Hong Kong*, Hong Kong
Vector calculus, differentiation and integration techniques.

Fall 2016 **Teaching Assistant MA2503 – Linear Algebra**, *City University of Hong Kong*, Hong Kong
Matrix calculus and finite dimensional spaces.

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