

Curriculum Vitae

Gianni Pedrizzetti PhD

Professor, Department of Engineering and Architecture, University of Trieste, Trieste, Italy.

Date of Birth: 7 Sept 1963
Place of Birth: Prato, Italy
Citizenship: Italian
Status: Married (1989), with 3 children (1996, 2001, 2008)
ORCID: 0000-0003-2886-7653

EDUCATION

1992 PhD, School of Engineering, University of Padova, Italy
1987 Laurea (Ms) in Civil Engineering, School of Engineering, University of Firenze, Italy

ACADEMIC APPOINTMENTS

2006 – present Professor, Dept Engineering and Architecture, University of Trieste, Italy
2022 – 2025 Project Scientist, Dept Bioengineering, University of California, Irvine, USA
Funded by National Institute of Health
2012 – 2013 Sr. Research Associate, Mount Sinai School of Medicine, NY.
Funded by Mount Sinai Heart Center
2011 – 2012 Visiting Professor, Dept. Bioengineering, University of California Irvine, USA
Funded by American Heart Association
2009 – 2011 Adj. Professor of Bioengineering, School of Medicine, Univ. of Firenze.
2008 – 2010 Adj. Professor of Biomechanics, School of Engineering, Univ. of Trieste.
2000 – 2001 Adj. Professor of Hydraulics, School of Engineering, Univ. of Pisa.
1998 – 2006 Associate Professor, School of Engineering, University of Trieste, Italy.
1998 Senior Research Associate, University of Cambridge, UK.
Funded by European TMR Research Network, Co-funded by British Council
1995 – 1998 Adj. Lecturer of Fluid Mechanics, School of Engineering, Univ. Firenze.
1992 – 1998 Permanent Research position, University of Firenze, Italy.
1994 Post-Doc, ETSIA, Universidad Politecnica de Madrid, Spain.
Fellowship funded by European Union ERB
1992 Post-Doc, INLS, University of California San Diego, CA.
Fellowship funded by University of Firenze

ACADEMIC ACTIVITY, REFEREE, AND MEMBERSHIP (last 10 years)

2017 – present President of graduation committee, school of Engineering, University of Trieste.
2006 – present Board of PhD program in Earth Science, Fluid Dynamics, and Mathematics, University of Trieste.
2025 Organizing Committee, The 10th International Biofluid Mechanics and Mechanobiology Symposium (IBMS 10), Irvine CA, USA

- 2025 Scientific Committee, Congress of the European Society of Biomechanics, Italian Chapter (ESB-ITA), Palermo
- 2025 Scientific Committee, Congress of the National Group of Bioengineering (GNB), Palermo
- 2023 Scientific Committee, Congress of the National Group of Bioengineering (GNB), Padova
- 2023 Chair, II Congress Biomechanics AIMETA, Reggio Calabria
- 2021 Congress Chair, Congress of the National Group of Bioengineering (GNB), Trieste
- 2015 – 2024 Board of Biomechanics for AIMETA (Italian Ass. Theoretical & Applied Mechanics)
- 2021 Chair, VII Congress of the National Group of Bioengineering (GNB), Trieste
- 2021 Chair, series of online meetings AIMETA Group of Biomechanics
- 2018 co-Chair, Symposium SES2018 “Cardiac biomechanics: heart meets blood”, Madrid
- 2017 President of PhD committee, Gran Sasso Scientific Institute, L’Aquila.
- 2014 – 2018 Member of Task force of EACVI (European Association of Cardiovascular Imaging), ASE (American Society of Echocardiography) to standardize deformation imaging. Joint-first author of 2015 consensus paper: Definitions for a common standard for 2D speckle tracking echocardiography. *EIJ-CVI* 2015;16:1-11. & *JASE* 2015; 28:183-193.
- 2012 – 2020 Assistant and Evaluator for the EU (FP7-HEALTH; H2020-MSCA-ITN-2016, 2017, 2018)
- 2016 – 2017 Editor in Chief: Special Issue of *Meccanica* on Advances in Biomechanics.

LATEST 10 INVITED PRESENTATIONS AT INTERNATIONAL CONFERENCES:

- 2023 Congress European Society of Biomechanics, Italian Chapter. Torino. *Cardiac fluid mechanics in the clinical scenario: the tale from theoretical models to clinical practice.*
- 2023 Kalmanson Lecture American Society of Echocardiography, National Harbour, MD. *Vorticity: from first principles to clinical application in cardiology.*
- 2023 School of Bioengineering, Bressanone. *Cardiac Modeling in Sport.*
- 2021 Re-iMAGINE Echo, New York (online). *4D Flow – The Right Ventricle.*
- 2020 Re-iMAGINE Echo, New York (online). *GCS / Torsion: What is it?.*
- 2019 School of Bioengineering, Bressanone. *Imaging-based assessment of mechanical cardiac function.*
- 2019 EuroEcho Imaging, Wien. *Characterization of Intraventricular Vortex Flow by Echocardiography.*
- 2018 Echo360, Seoul. *Vortex Imaging for LV Energetics and Function.*
- 2017 EuroEcho Imaging, Lisbon. *Vortex imaging: role in congenital heart disease.*
- 2017 EuroCMR, Prague. *Myocardial mechanics feature tracking and velocity.*

ACADEMIC TEACHING ACTIVITY (last 10 years)

- 2015 – present Course of Biofluid dynamics (MS in Clinical Engineering). University of Trieste.
- 2024 – 2025 Course of Biomechanics (MS in Clinical Engineering). University of Trieste.
- 2016 – 2024 Course of Engineering Numerical Analysis, PhD program in Earth Science, Fluid Dynamics, and Mathematics, University of Trieste.

- 2017 – 2020 Course of Analysis of Sequences of Biomedical Images (MS in Clinical Engineering), University of Trieste.
- 2014 – 2017 Course of Applied Hydraulics (MS in Civil and Environmental Engineering), University of Trieste.

ACADEMIC GRANT SUPPORT (last 10 years)

- 2023 – 2025 PRIN 2022. Italian Ministry of Research.
Title: Fluid dynamics of the right heart for early detection of disease development.
Role: Local PI
- 2022 – 2027 R01 National Institute of Health (USA).
Title: The state of energy in patients with pulmonary arterial hypertension.
Role: co-PI
- 2019 – 2022 PRIN 2017. Italian Ministry of Research.
Title: Fluid dynamics of hearts at risk of failure.
Role: Local PI
- 2019 – 2020 Research support from Icahn School of Medicine at Mt. Sinai, NY.
Title: Numerical assessment of mitral valve repair surgical procedure.
Role: PI
- 2014-2017 PRIN. Italian Minister of Education and Research.
Title: Hemodynamics of the aortic valve/artery functional unit.
Role: Local PI

TECHNOLOGY TRANSFER ACTIVITY

Scientific advisor for industrial companies in the field of medical imaging for activity of technological transfer. Creator, from ideation to production phases of novel solutions for the objective evaluation of cardiovascular function. Developer of numerous prototypes and a few products.

Products developed in partnership with industry

Industrial Partner: Siemens Healthineers, Ultrasound Division (Mountain View, CA, USA)

1. 2D Velocity Vector Imaging (2006 – present);
2. Contrast Dynamics (2009 – present);
3. OmegaFlow (2008 – 2011).

Industrial Partner: TomTec GmbH (Unterschleissheim, Germany)

4. 2D Cardiac Performance Analysis (2009 – present);
5. Speckle Tracking Library (2010 – present, distributed to several partners);
6. CPA-MRI (2011 – 2020);
7. 4D LVA (2011 – 2015).

Industrial Partner: Visualsonics-Fujifilm (Toronto, Canada)

8. VevoStrain (2010 – present);

9. VevoVasc (2011 – present).

Industrial Partner: GE Healthcare's Women's Health Ultrasound division (Zips, Austria)

10. QStrain (2016 – present)

Industrial Partner: Medis bv (Leiden, The Netherlands)

11. QStrain (2016 – present)

Industrial Partner: Esaote S.p.A. (Genova, Italy)

12. HyperDoppler (2019 – present)

13. Xstrain (2006 – present)

14. Qontrast (2004 – 2010)

PUBLICATIONS:

Author of 3 books (one textbook, one monograph and one edited book).

Author of 5 cover images and whole year 2013 cover for Nature Review Cardiology.

Author of 183 papers in international journals including reviews and guideline (Scopus: 16 Jan 2025)

Citations 7637 (h-index 42; Scopus: 4 Oct 2023).

Designated inventor in 14 granted patents.

Top Recent 10 Scientific Papers (10 years track)

1. Pedrizzetti G, Numata R, Colli D, Pedrizzetti G, Zovatto L, Banerjee A. A Scenario for Heart Failure during the Filling Phase. *Sci Rep* 2024;14:22760.
2. Colli D, Angeli E, Careddu L, Pedrizzetti G. Analysis of the distribution and orientation of oxygenated and non-oxygenated blood in a Double Outlet Right Ventricle. *Phys Fl* 2023;35(9):0163885.
3. Vallenga F, Airale L, Tonti G, Argulian E, Milan A, Narula J, Pedrizzetti G. An Introduction to Hemodynamic Force Analysis: Analysis: moving into the new frontier of cardiac deformation analysis. *J Am Heart Assoc* 2021;10:e023417.
4. Pedrizzetti G, Faganello G, Croatto E, Di Lenarda A. Heart's Hemodynamic Power Differentiates Normal from Diseased Right Ventricles. *J Biomech* 2021; 119:110312.
5. Pedrizzetti G. On the computation of hemodynamic forces in the heart chambers. *J Biomech* 2019; 95:109323.
6. Colli D, Vukicevic M, Meschini V, Zovatto L, Pedrizzetti G. Simplified mitral valve modelling for prospective clinical application of left ventricular fluid dynamics. *J Comput Phys* 2019.
7. Pedrizzetti G, Arvidsson PM, Töger J, Borgquist R, Domenichini F, Arheden H, Heiberg E. On estimating intraventricular hemodynamic forces from endocardial dynamics: a comparative study with 4D flow MRI. *J Biomech* 2017; 60:203-210.
8. Pedrizzetti G, Claus P, Kilner PJ, Nagel E. Principles of cardiovascular magnetic resonance feature tracking and echocardiographic speckle tracking for informed clinical use. *J Cardiovasc Magn Reson* 2016; 18:51.

9. Pedrizzetti G, Martiniello AR, Bianchi V, D'Onofrio A, Caso P, Tonti G. Changes in electrical activation modify the direction of left ventricular flow momentum: novel observations using Echocardiographic Particle Image Velocimetry. *Eur Heart J, Cardiovasc Imag* 2016; 17:203-209.
10. Pedrizzetti G, Sengupta S, Caracciolo G, Park CS, Amaki M, Goliash G, Narula J, Sengupta PP. Three-dimensional Principal Strain Analysis for Characterizing Subclinical Changes in Left Ventricular Function. *J Am Soc Echocardiogr* 2014; 27:1041-50.

Most Cited 10 Publications

1. Voigt JU, Pedrizzetti G, Lysyansky P, Marwick TH, Houle H, Baumann R, Pedri S, Ito Y, Abe Y, Metz S, Song J, Hamilton J, Sengupta P, Kolias TJ, d'Hooge J, Aurigemma GP, Thomas JD, Badano L. Definitions for a common standard for 2D speckle tracking echocardiography: consensus document of the EACVI/ASE/Industry Task Force to standardize deformation imaging. *Eur Heart J, Cardiovasc Imag* 2015; 16:1-11 & *J Am Soc Echocardiogr* 2015; 28:183-93. [1556 citations]
2. Claus P, Omar AMS, Pedrizzetti G, Sengupta PP, Nagel E. Tissue Tracking Technology for Assessing Cardiac Mechanics. *JACC Imaging* 2015; 12:1444-60. [375 citations]
3. Pedrizzetti G, Claus P, Kilner PJ, Nagel E. Principles of cardiovascular magnetic resonance feature tracking and echocardiographic speckle tracking for informed clinical use. *J Cardiovasc Magn Reson* 2016; 18:51. [305 citations]
4. Hong GR, Pedrizzetti G, Tonti G, Li P, Wei Z, Kim JK, Bawela A, Liu S, Chung N, Houle H, Narula J, Vannan MA. Characterization and Quantification of Vortex Flow in the Human Left Ventricle by Contrast Echocardiography Using Vector Particle Image Velocimetry. *JACC Cardiovasc Imaging* 2008; 1:705-717. [297 citations]
5. Pedrizzetti G, Domenichini F. Nature optimizes the swirling flow in the human left ventricle. *Phys Rev Lett* 2005; 95:108101. [225 citations]
6. Sengupta PP, Pedrizzetti G, Kilner P., Kheradvar A, Ebberts T, Frazer A, Tonti G, Narula J. Emerging Trends in CV Flow Visualization. *J Am Coll Cardiol Img* 2012; 5:305-316. [225 citations]
7. Pedrizzetti G, La Canna G, Alfieri O, Tonti G. The vortex - an early predictor of cardiovascular outcome. *Nature Reviews Cardiology* 2014; 11:545-53. [216 citations]
8. Zovatto L, Pedrizzetti G. Flow about a circular cylinder between parallel walls. *J Fluid Mech* 2001; 440:1-25. [198 citations]
9. Kheradvar A, Houle H, Pedrizzetti G, Tonti G, Belcik T, Ashraf M, Lindner J, Gharib M, Sahn D. Echographic Particle Image Velocimetry: a novel technique for quantification of left ventricular blood vorticity pattern. *J Am Soc Echocardiogr* 2010; 23:86-94. [175 citations]
10. Faludi R, Szulik M, D'hooge J, Herijgers P, Rademakers F, Pedrizzetti G, Voigt J-U. Left ventricular flow patterns in healthy subjects and patients with prosthetic mitral valves: An in vivo study using echocardiographic particle image velocimetry. *J Thorac Cardiovasc Surg* 2010; 139:1501-1510. [161 citations]

Top Recent Editorials/Letters to the Editor

1. Pedrizzetti G. Atrial Strain in Cardiovascular Magnetic Resonance Imaging, a Sensitive Companion of Ventricular Strain. *Int J Cardiol* 2023. DOI: 10.1016/j.ijcard.2023.131604

2. Kheradvar A, Vannan M, Dasi LP, Pedrizzetti G. The Effect of Aortic Root Anatomy and Vortex Flow Induced Shear Stress on the Aortic Valve Leaflets. *Eur Heart J, Cardiovasc Imag* 2021. DOI:10.1093/ehjci/jeab031
3. Pedrizzetti G, Lapinskas T, Tonti G, Stoiber L, Zaliunas R, Pieske B, Kelle S. The relationship between ejection fraction and strain permits a more accurate assessment of left ventricular systolic function. *JACC Cardiovasc Imaging* 2019; 12:1893-1895.
4. Lapinskas T, Pedrizzetti G, Stoiber L, Dungen HD, Edelmann F, Pieske B, Kelle S. The intraventricular hemodynamic forces estimated using routine CMR cine images: A new marker of failing heart. *JACC Imaging* 2019; 12:377-379. DOI: 10.1016/j.jcmg.2018.08.012.
5. Pedrizzetti G, Vlachos PP, Little WC, Sotiropoulos F, Gharib M, Kheradvar A. Comments on Defining the Contribution of Diastolic Vortex Ring to Left Ventricular Filling. *J Am Coll Cardiol* 2015; 65:2573-2574.

Covers of Scientific Journals

1. *J Am Soc Echocardiogr*, Vol. 36, issue 8, 2023 (authored image on RV deformation).
2. *Nature Reviews Cardiology*, Vol. 10, issues 1-12, 2013 (authored image on LV fluid dynamics).
3. *J Am Coll Cardiol Img*, Vol. 6, issue 5, 2013 (authored image on RV fluid dynamics).
4. *J Am Coll Cardiol Img*, Vol. 5, issue 3, 2012 (authored image on LV-RV fluid dynamics).
5. *Ann Biomed Eng* Vol. 40, issue 8, 2012 (authored image on RV fluid dynamics).

Books

1. Pedrizzetti G. *Fluid Dynamics for Cardiovascular Engineering*. Springer-Nature 2022 (ISBN 978-3-030-85942-8).
2. Kheradvar A, Pedrizzetti G. *Vortex Formation in the Cardiovascular System*. Springer-Verlag London Ltd. 2012 (ISBN 978-1-4471-2287-6).
3. Pedrizzetti G, Perktold K eds. *CardioVascular Fluid Mechanics*. Springer-Verlag Wien New York 2003 (ISBN 3-211-00538-2).

Most Recent 10 Granted Patents:

1. Method and device for monitoring a flow of a fluid in a vessel. EP US NL NL2029633B1. Priority 2021-11-04. Granted 2023-06-02.
2. Method of determining a motion of a heart wall. WO NL NL2028172B1. Priority 2021-05-07. Granted 2022-11-24.
3. Method of determining vessel fluid flow velocity. WO EP NL NL2026715B1. Priority 2020-10-20. Granted 2022-06-16.
4. Method and device for cardiac electric synchronization. WO EP US US11559691B2. Priority 2017-09-23. Granted 2023-01-24.
5. Method and device for analyzing and displaying blood flow information. US DE DE102015201984B4. Priority 2014-02-06. Granted 2018-09-20.
6. Method and device for quantitative dynamic evaluation of skeletal muscles. WO EP US IT EP2988675B1. Priority 2013-04-23. Granted 2023-08-30.
7. Method of transforming a doppler velocity dataset into a velocity vector field. EP US US8858437B2. Priority 2011-04-18. Granted 2014-10-14.

8. Method and system for managing and displaying medical data. WO EP US CN DE DE112010001870T8. Priority 2009-04-30. Granted 2012-12-06.
9. Method of tracking position and velocity of objects' borders in two or three dimensions. EP US AT US8098912B2. Priority 2003-09-30. Granted 2012-01-17.
10. Measurement method of time varying events in a target body. EP US US8142358B2. Priority 2005-06-08. Granted 2012-03-27.

16 January 2025

Prof. Ing Gianni Pedrizzetti
