

# Curriculum vitae of PAOLO GAETANI

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## Education:

- 1993: Degree in Mechanical Engineering at Politecnico di Milano
- 1997: PhD in Energetics; the PhD thesis concerns the analysis of the three-dimensional unsteady flow in a centrifugal fan.

## Academic and working experience

- 1997: 1 year grant for the design and development of a test rig for centrifugal and axial fans.
- 1998 – 2001 Research engineer: in this period the principal activities were the upgrading of a test rig for compressors and turbines and the development of new measuring techniques for unsteady flows
- 2001 – 2010: Assistant Professor at the Politecnico di Milano in “Fluid Machines” holding a course of “Turbomachines” and contributes on advanced measuring techniques in the frame of PhD courses like “experimental thermo-fluidynamics”.
- current position from 2010: Associate Professor in the field of "Fluid Machines". In the years 2010-15, I've been teaching the courses of “fundamental of Turbomachines”, “Energy systems”, “laboratory of energetics”, “fluid machines and energy systems” for the bachelor degree and “Turbomachinery and internal combustion engines”. Since 2015 professor in “turbomachinery” for the master degree.
- since 2014, habilitated for the full professor position
- research scientist and/or leader of research programmes financed by private companies or public bodies in the field of turbomachine aerodynamics and measuring techniques.

## Skills and research field:

As a general consideration, publications list describes the research activities performed since the end of 90's. Here the main skills are reported.

- Turbomachinery and general aerodynamic specialist: axial turbines and centrifugal compressors / pumps have been the main research topics. In particular, the issue related to the stator – rotor interaction, as well as the impeller-diffusers interaction have been and are still deeply investigated both from the experimental and phenomenological point of view.
- Measurement techniques specialist for aerodynamic and turbomachinery applications: depending on the research issue different instrumentations have been applied and the more frequent instrumentation applied are pressure probes, both for unsteady and steady measurements. LDV and PIV have been applied in the hydraulic machines studies.
- Development of conventional and new-concept probes for steady and unsteady aerodynamic measurements. As new aerodynamic issues are investigated, new probes have been developed in the fluid-machines lab. After having successfully developed the fast response aerodynamic pressure probe and applied it in some test rig in Europe, P. Gaetani is now working on the development of fast micro-thermocouples for measurements in the range of some hundreds of Hertz.

## Other Responsibilities:

- Leader of the Energy dept. working group on “the development of measuring techniques for application in the turbomachines working with real gases” in the frame of the project PRIN2007.
- leader of the Energy dept. working group in European FP7 project “RECORD”.
- Leader in some contracts with industrial partner
- Research scientist at the Laboratorio di Fluidodinamica delle Macchine – LFM (Fluid Machinery Lab.)
- reviewer for a number of journals and congresses.
- Member of Organising committee of the “XXth biannual symposium on measuring techniques in turbomachines”.

### **Publications in English language:**

1. Boccazzi A., P. Gaetani, R. Sala, "Experimental investigation on hydraulic losses of a centrifugal pump operating as turbine" 3rd ASME Pumping Symposium, Vancouver, 1997, (Canada).
2. Barigozzi G., Dossena V., Gaetani P. "Development and first application of a single hole fast response pressure probe", 15th Symposium on Measuring Techniques for Transonic and Supersonic Flows in Cascades and Turbomachines, Firenze, Settembre 2000, (Italy).
3. Dossena V., Gaetani P., Marinoni F., Osnaghi C. "On the influence of back pressure and size on the performance of safety valves", ASME Pressure Vessels and Piping conference, Vancouver, August 2002 (Canada)
4. Dossena V., Gaetani P., Persico G., 2004, "Development of high response pressure probes for time-resolved 2D and 3D flow measurements in turbomachines" 17th Symposium on Measuring Techniques in Transonic and Supersonic Flow in Cascades and Turbomachines, Stockholm (Sweden).
5. Gaetani P., Persico G., 2004, "On the development of cylindrical fast response pressure probes" 59° Congresso ATI, Genova (Italy)
6. Gaetani P., Osnaghi C. and Persico G., 2004, "Preliminary analysis of stator-rotor interaction in a high pressure turbine stage", 59° Congresso ATI, Genova (Italy).
7. Persico G., Gaetani P. Guardone A., 2005 "Dynamic calibration of fast-response probes in a low pressure shock tube" Meas. Sci. Technol. Vol. 16 (2005), pp 1751-1759
8. Persico G., Gaetani P. Guardone A., 2005 "Design and analysis of a new concept fast-response pressure probes" Meas. Sci. Technol. Vol. 16 (2005), pp 1741-1750
9. Dossena V., Gaetani P., Osnaghi C., 2005 "Recent research activities on turbomachines fluid dynamics at Politecnico di Milano" Workshop: modelling of rotating machinery in power plants. Monitoring and diagnostics, Milano. ISBN 88-901916-0-0 (Italy)
10. Gaetani P., Osnaghi C., Persico G., 2005, "Experimental analysis of the unsteady flow field downstream a high pressure turbine stage", 60° Congresso ATI, Roma (Italy).
11. Gaetani P., Persico G., Dossena V., Osnaghi C., 2006 "Investigation of the Flow Field in a HP Turbine Stage for Two Stator-Rotor Axial Gaps: Part I – 3D time average flow field." Asme Turbo Expo 2006, Paper GT2006-90553, Barcelona (Spain).
12. Gaetani P., Persico G., Dossena V., Osnaghi C., 2006 "Investigation of the Flow Field in a HP Turbine Stage for Two Stator-Rotor Axial Gaps: Part II – Unsteady Flow Field." Asme Turbo Expo 2006, Paper GT2006-90556, Barcelona (Spain).
13. Gaetani P., Persico G., 2006 "Influence of the rotor loading on the vortex-blade interaction in HP turbine" published in TURBOMACHINES Aeroelasticity Aeroacoustics Unsteady Aerodynamics edited by V. Skibin, V. Saren, N. Savin, S. Frolov - TORUS PRESS, ISBN 5-94588-041-8
14. Gaetani P., Persico G., Osnaghi C., 2007, "Influence of Rotor Loading on the Unsteady Flow field Downstream of a HP Turbine Stage", European Turbomachinery Conference, 2007 Athens (Greece).
15. Persico G., Gaetani P., Osnaghi C., 2007 "Effects of off-design operating conditions on the blade row interaction in a HP turbine stage" Asme Turbo Expo 2007, Paper GT2007-27185, Montreal (Canada).
16. Gaetani P., Persico G., Osnaghi C., 2007, "Effects of the Axial Gap on the Vane – Rotor Interaction in a Hp Turbine Stage" ISABE conference, Beijing (China)

17. Gaetani P., Persico G., Dossena V., Osnaghi C., "Investigation of the Flow Field in a HP Turbine Stage for Two Stator-Rotor Axial Gaps: Part I – 3D time average flow field." ASME Journal of Turbomachinery, Vol. 129, pp. 572-579.
18. Gaetani P., Persico G., Dossena V., Osnaghi C., "Investigation of the Flow Field in a HP Turbine Stage for Two Stator-Rotor Axial Gaps: Part II –Unsteady Flow Field." ASME Journal of Turbomachinery, Vol. 129, pp. 580-590.
19. Gaetani P., Guardone A., Persico G. "Shock tube flows past partially opened diaphragms" Journal of Fluid Mechanics, Volume 602 (2008) pp. 267-286.
20. B. Paradiso, G. Persico, P. Gaetani, O. Schennach, J. Woisetschläger "Blade row interaction in a one and a half stage transonic turbine focusing on three dimensional effects: part I – stator-rotor interaction" ASME Turbo Expo 2008, paper GT2008-50291, Berlin, Germany
21. O. Schennach, B. Paradiso, G. Persico, P. Gaetani, J. Woisetschläger "Blade row interaction in a one and a half stage transonic turbine focusing on three dimensional effects: part II – clocking effects" ASME Turbo Expo 2008, paper GT2008-50065, Berlin, Germany
22. G. Persico, P. Gaetani, B. Paradiso, "Estimation of turbulence by single-sensor pressure probes" XIX Symposium on Measuring Techniques in Transonic and Supersonic Flow in Cascades and Turbomachines, Rhode S. Genese (Belgium), 2008.
23. G. Persico, P. Gaetani, V. Dossena, C. Osnaghi, G. D'Ippolito, 2009 "On the definition of secondary flows in annular cascades" , European Turbomachinery Conference, 2009 Graz (Austria).
24. B. Paradiso, G. Persico, P. Gaetani, O. Schennach, R. Pecnik, J. Woisetschläger, 2009 "Three dimensional vane-rotor-vane interaction in a one and a half transonic turbine stage", European Turbomachinery Conference, 2009 Graz (Austria).
25. G. Persico, P. Gaetani, C. Osnaghi, 2009, "A parametric study of the blade row interaction in a high pressure turbine stage", ASME Journal of Turbomachinery, Vol. 131, pp. 031006-1, 031006-13.
26. G. Persico, A. Mora, P. Gaetani, M. Savini, "CFD Assessment of Vortex Interactions in Turbines", 4th Symposium on Integrating CFD and Experiments in Aerodynamics, 14-16 Settembre 2009, Rhode Saint Genese (Belgium), pp. 1—13.
27. G. Persico, P. Gaetani, V. Dossena, G. D'Ippolito, C. Osnaghi, "On the Definition of the Secondary Flow in Three-Dimensional Cascades", I Mech E Part A: Journal of Power and Energy (ISSN 0957-6509), Vol. 223, Issue 6, pp. 667—676.
28. O. Schennach, J. Woisetschläger, B. Paradiso, G. Persico, P. Gaetani "Three Dimensional Clocking Effects in a One and a Half Stage Transonic Turbine", pp 011019/1-10, Inglese, Journal of Turbomachinery, Vol. 132, N°1, January 2010.
29. P. Gaetani, G. Persico, C. Osnaghi "Effects of Axial Gap on the Vane-Rotor Interaction in a Low Aspect Ratio Turbine Stage" , pp 325-334, Inglese, AIAA Journal of Propulsion and Power, ISSN 0748-4658, Vol. 26, n° 2, March-April 2010.
30. A. Spinelli, V. Dossena, P. Gaetani, C. Osnaghi, D. Colombo, "Design of a test rig for organic vapours" Asme Paper GT2010-22959, Asme TurboExpo, Glasgow, June 2010.
31. G. Persico, A. Mora, P. Gaetani, M. Savini, "Unsteady aerodynamics of a low aspect ratio turbine stage: modeling issues and flow physics" Asme Paper GT2010-22927, Asme TurboExpo, Glasgow, June 2010.
32. A. Spinelli, M. Pini, V. Dossena, P. Gaetani, C. Osnaghi "Test rig for organic vapour: design and simulation of operation", XX symposium on measuring techniques in turbomachinery, Milano 23-24 September 2010.

33. G. Persico, V. Dossena, P. Gaetani, "On the capability of fast response pressure probes to measure turbulence kinetic energy", XX symposium on measuring techniques in turbomachinery, Milano 23-24 September 2010.
34. L. Toni, V. Ballerini, S. Cioncolini, P. Gaetani, G. Persico, "Unsteady Flow Field Measurements in an Industrial Centrifugal Compressor" 39th Turbomachinery Symposium - October 4-7, 2010 – Houston, Texas
35. A. Boccazzi, R. Sala, P. Gaetani "Influence of the diffuser vane setting angle on the flow field in a radial pump", pag. 10, Istanbul, European Turbomachinery Conference, paper 133.
36. P. Gaetani, C. Osnaghi, V. Dossena "analysis of the impeller – vaned diffuser interaction in a centrifugal compressor by means of an aerodynamic fast response pressure probe", pag. 11, Istanbul, European Turbomachinery Conference, paper 140.
37. M. Pini, A. Spinelli, V. Dossena, P. Gaetani, F. Casella "Dynamic simulation of a test rig for organic vapours", pag. 12, Washington, International Conference on Energy Sustainability, paper ESFuelCell2011-54212.
38. P. Gaetani, G. Persico, A. Mora, V. Dossena, C. Osnaghi "Impeller – vaned diffuser interaction in a centrifugal compressor at the best efficiency point", pag. 11, Vancouver, ASME GT2011-46223, Proceedings of ASME Turbo Expo 2011: Power for Land, Sea and Air, June 6-10, 2011, Vancouver, Canada.
39. P. Gaetani, G. Persico, A. Mora, V. Dossena, C. Osnaghi "Impeller – vaned diffuser interaction in a centrifugal compressor at off design conditions", pag. 12, Vancouver, ASME GT2011-46234, Proceedings of ASME Turbo Expo 2011: Power for Land, Sea and Air, June 6-10, 2011, Vancouver, Canada.
40. E. Guidotti, L. Tapinassi, L. Toni, L. Bianchi, P. Gaetani, G. Persico "Experimental and numerical analysis of the flow field in the impeller of a centrifugal compressor stage at design point", pag. 12, Vancouver, ASME GT2011-45036, Proceedings of ASME Turbo Expo 2011: Power for Land, Sea and Air, June 6-10, 2011, Vancouver, Canada.
41. A. Boccazzi, R. Sala, P. Gaetani "Flow field in the vaned diffuser of a centrifugal pump at different vane setting angles", pag. 12, Hamamatsu Shizuoka ASME AJK2011-06068, Proceedings of ASME-JSME-KSME Joint Fluids Engineering Conference, July 24-29, 2011, Hamamatsu Shizuoka, Japan.
42. A. Spinelli, M. Pini, V. Dossena, P. Gaetani, F. Casella "Design, simulation and construction of a test rig for organic vapours", Delft, The Netherlands, First International Seminar on ORC Power Systems, paper 38.
43. P. Gaetani, A. Boccazzi, R. Sala, "Low Field in the Vaned Diffuser of a Centrifugal Pump at Different Vane Setting Angles" *J. Fluids Eng.* 134, 031101 (2012)
44. G. Persico, A. Mora, P. Gaetani, M. Savini, "Unsteady Aerodynamics of a Low Aspect Ratio Turbine Stage: Modeling Issues and Flow Physics" *J. Turbomach.* 134, 061030 (2012) (10 pages)
45. P. Gaetani, G. Persico, A. Mora, V. Dossena, C. Osnaghi, "Impeller-Vaned Diffuser Interaction in a Centrifugal Compressor at Off Design Conditions" *J. Turbomach.* 134, 061034 (2012) (9 pages)
46. G. Persico, M. Pini, V. Dossena, P. Gaetani, "Aerodynamic design and analysis of centrifugal turbine cascades" ASME paper GT2013- 95770, Proceedings of the 2013 ASME Turbo Expo, June 3-7, 2013, San Antonio, Texas, USA.
47. A. Spinelli, V. Dossena, P. Gaetani, 2013 "Start-up of a Test Rig for Organic Vapors". In Proceedings of ASME ORC 2013, 2nd International Seminar on Organic Rankine Cycle Power Systems. October 7th & 8th 2013, Rotterdam, The Netherlands.

48. G. Persico, M. Pini, V. Dossena, P. Gaetani, 2013 “Aerodynamics of Centrifugal Turbine Cascades” 2nd International Seminar on Organic Rankine Cycle Power Systems. October 7th & 8th 2013, Rotterdam, The Netherlands.
49. A. Spinelli, M. Pini, V. Dossena, P. Gaetani, F. Casella, 2013. “Design, Simulation, and Construction of a Test Rig for Organic Vapours”. ASME Journal of Engineering for Gas Turbines and Power, Vol. 135, 042303.
50. L. Pinelli, F. Poli, A. Arnone, S. Guerin, A. Holewa, J. Aparicio, R. Puente, D. Torzo, C. Favre, P. Gaetani, G. Persico, 2015 “on the numerical evaluation of the tone noise emission generated by a turbine stage: an in-depth comparison among different computational method” GT2015-42376, Proceedings of ASME Turbo Expo 2015: Power for Land, Sea and Air, June 15-19, 2015, Montreal, Canada
51. B. Paradiso, P. Gaetani, A. Mora, V. Dossena, C. Osnaghi, L. Arcangeli, F. Gerbi, N. Maceli, R. Quadrelli, 2015, “Design and operation of a low speed test turbine facility”, European Turbomachinery Conference, Madrid, Spain.
52. P. Gaetani, G. Persico, A. Spinelli, C. Sandu, F. Niculescu, 2015, “Entropy wave generator for indirect combustion noise experiments in a high-pressure turbine”, European Turbomachinery Conference, Madrid, Spain.
53. G. Persico, M. Pini, V. Dossena, 2015, “Aerodynamics of Centrifugal turbine cascades”, Journal of engineering for gas turbines and power, Vol. 137, 112602-1.
54. A. Spinelli, A. Guardone, F. Cozzi, M. Carmine, R. Cheli, M. Zocca, P. Gaetani, V. Dossena, 2015 “Experimental observation of non-ideal nozzle flow of siloxane vapor MDM” 3rd International Seminar on Organic Rankine Cycle Power Systems. October 12th-14th 2015, Brussels, Belgium
55. P. Gaetani, G. Persico, A. Spinelli, A. Mora, 2016, "Impact of the Expansion Ratio on the Unsteady Aerodynamics and Performance of a HP Axial Turbine”, Proceedings of ASME Turbo Expo 2016, GT2016-56650: June 13-17, 2016, Seoul, South Korea.
56. G. Gatti, P. Gaetani, B. Paradiso, V. Dossena, L. Arcangeli, N. Maceli, J. Bellucci, 2016, “An experimental study of the aerodynamic forcing function in a 1.5 steam turbine stage”, Proceedings of ASME Turbo Expo 2016, GT2016-56939: June 13-17, 2016, Seoul, South Korea.
57. K. Knobloch, L. Neuhaus, F. Bake, P. Gaetani, G. Persico, 2016, “Experimental assessment of the noise generation and transmission in a high – pressure transonic stage” Proceedings of ASME Turbo Expo 2016, GT2016-57209: June 13-17, 2016, Seoul, South Korea.
58. Andrea Spinelli, Fabio Cozzi, Vincenzo Dossena, Paolo Gaetani, Marta Zocca, Alberto Guardone, 2016, “Experimental investigation of the non-ideal expansion flow of the siloxane vapour MDM”, Proceedings of ASME Turbo Expo 2016, GT2016-57357: June 13-17, 2016, Seoul, South Korea.
59. F. Bake, P. Gaetani, G. Persico, L. Neuhaus, K. Knobloch, 2016, “Indirect Noise Generation in a High Pressure Turbine Stage”, 22nd AIAA CEAS Aeroacoustics conference, 2016
60. P. Gaetani - G. Persico, 2017, “hot streak evolution in an axial HP turbine stage” Proceedings of 12th European Conference on Turbomachinery Fluid dynamics & Thermodynamics, paperETC2017-182, ETC12, April 3-7, 2017; Stockholm, Sweden
61. Spinelli A., Cozzi F., Cammi G., Zocca M., Gaetani P., Dossena V., Guardone A., 2017, “Preliminary characterisation of an expanding flow of siloxane vapour MDM”, NiCfd conference, 21-22 October, Varenna - Italy

62. G. Persico, V. Dossena, P. Gaetani, 2017, "Optimal Aerodynamic Design of a transonic Centrifugal Turbine Stage for Organic Rankine Cycle Applications" Energy Procedia 00 (2017) 000–000. [www.elsevier.com/locate/procedia](http://www.elsevier.com/locate/procedia) IV International Seminar on ORC Power Systems, ORC2017, 13-15 September 2017, Milano, Italy
63. G. Gatti, P. Gaetani, B. Paradiso, V. Dossena, L. Arcangeli, N. Maceli, J. Bellucci, 2017, "An experimental study of the aerodynamic forcing function in a 1.5 steam turbine stage", Journal of engineering for gas turbine and power, Vol. 139, 052503-1
64. P. Gaetani, G. Persico, A. Spinelli, 2017, "Coupled Effect of Expansion Ratio and Blade Loading on the Aerodynamics of a High-Pressure Gas Turbine" Appl. Sci. 2017, 7, 259; doi:10.3390/app7030259
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