

Curriculum vitae

Paolo Francesco Barbante
Politecnico di Milano
Dip. di Matematica
P.zza Leonardo da Vinci 32, 20133 Milano, Italy
Tel.: 0039 02 23994563
e-mail: paolo.barbante@polimi.it

Posizione attuale

Febbraio 2005- Ricercatore, Politecnico di Milano, Dip. di Matematica. Settore scientifico disciplinare 01/A4 (Fisica Matematica).

Borse post-dottorato

2001-2005: Assegnista di ricerca presso il Dip. di Matematica, Politecnico di Milano. Settembre 2001-Gennaio 2005.

Educazione

2001: Université Libre de Bruxelles, Belgio. Dottorato di Ricerca in Scienze Applicate.

1996: von Karman Institute for Fluid Dynamics, Rhode-St-Genèse, Belgio. Diploma Course in Fluid Dynamics. von Karman Prize per il miglior studente.

1996: Politecnico di Milano. Laurea in Ingegneria Aeronautica.

Insegnamenti

2017-2018: Titolare del corso di Meccanica Razionale. Ingegneria Civile ed Ambientale. Politecnico di Milano, Polo di Lecco.

2017-2018: Seminari didattici per il corso Combustion Processes in Thermochemical Propulsion. Ingegneria Aeronautica. Politecnico di Milano.

2016-2017: Titolare del corso di Meccanica Razionale. Ingegneria Civile ed Ambientale. Politecnico di Milano, Polo di Lecco.

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di Milano.

- 2015-2016: Titolare del corso di Meccanica Razionale. Ingegneria Civile ed Ambientale. Politecnico di Milano, Polo di Lecco.
- 2015-2016: Esercitazioni per il corso Combustione nei Sistemi Propulsivi. Ingegneria Aeronautica. Politecnico di Milano.
- 2014-2015: Titolare del corso di Meccanica Razionale. Ingegneria Civile ed Ambientale. Politecnico di Milano, Polo di Lecco.
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- 2009-2010: Titolare del corso di Meccanica Razionale. Ingegneria Civile ed Ambientale. Politecnico di Milano, Polo di Lecco.
- 2009-2010: Esercitazioni del corso di Meccanica Razionale. Ingegneria Edile. Politecnico di Milano.
- 2008-2009: Titolare del corso di Meccanica Razionale. Ingegneria Civile ed Ambientale. Politecnico di Milano, Polo di Lecco.
- 2008-2009: Esercitazioni del corso di Meccanica Razionale A. Ingegneria Biomedica. Politecnico di Milano.
- 2007-2008: Titolare del corso di Meccanica Razionale. Ingegneria Aerospaziale. Politecnico di Milano.
- 2007-2008: Esercitazioni del corso di Meccanica Razionale A. Ingegneria Biomedica. Politecnico di Milano.
- 2006-2007: Titolare del corso di Meccanica Razionale. Ingegneria Aerospaziale. Politecnico di Milano.
- 2006-2007: Esercitazioni del corso di Meccanica Razionale A. Ingegneria Biomedica. Politecnico di Milano.
- 2005-2006: Titolare del corso di Meccanica Razionale (Integrato). Ingegneria Meccanica. Politecnico di Milano.

- 2005-2006: Esercitazioni del corso di Meccanica Razionale A. Ingegneria Biomedica. Politecnico di Milano.
- 2004-2005: Esercitazioni del corso di Meccanica Razionale. Ingegneria Aerospaziale. Politecnico di Milano.
- 2003-2004: Esercitazioni del corso di Meccanica Razionale. Ingegneria Aerospaziale. Politecnico di Milano.
- 2002-2003: Esercitazioni del corso di Meccanica Razionale. Ingegneria Aerospaziale. Politecnico di Milano.
- 2001-2002: Esercitazioni del corso di Meccanica Razionale. Ingegneria Aerospaziale. Politecnico di Milano.

Interessi scientifici

- Modellazione e simulazione di flussi reagenti ipersonici.
- Catalisi eterogenea per flussi ipersonici.
- Combustione turbolenta.
- Modellazione fisico matematica di propulsori ibridi.
- Teoria cinetica dei gas densi.
- Modelli ad interfaccia diffusa per l'evaporazione e condensazione di film liquidi.

Pubblicazioni

G. Bellas-Chatzigeorgis, P. Barbante, T. Magin: *Development of catalytic and ablative gas-surface interaction models for the simulation of reacting gas mixtures*. 23rd AIAA Computational Fluid Dynamics Conference, 5-9 June 2017, AIAA Paper 4499-2017.

P. Barbante, A. Frezzotti: *A comparison of models for the evaporation of the Lennard-Jones fluid*. European Journal of Mechanics B, Fluids, Vol. 64, p. 69-80, 2017.

A. Frezzotti, P. Barbante: *Kinetic theory aspects of non-equilibrium liquid-vapor flows*. Mechanical Engineering Reviews, Vol. 4, p. 1-14, 2017.

A. Mazzetti, P. Barbante: *Numerical modeling of combustion processes in hybrid rocket engines*. International Journal of Energetic Materials and Chemical Propulsion, Vol. 15, p. 249-274, 2016.

P. Barbante, A. Frezzotti: *Simulations of condensation flows induced by reflection of weak shocks from liquid surfaces*. Proceedings of the 30th International Symposium on Rarefied Gas Dynamics. AIP Conf. Proc. 1786, p. 1100041-1100048, 2016.

P. Barbante, A. Frezzotti, L. Gibelli: *A kinetic theory description of liquid menisci at the microscale*. Kinetic and Related Models, Vol. 8 (2), 235-254, 2015.

G. Bellas-Chatzigeorgis, P. Barbante, T. Magin: *Development of detailed chemistry*

models for boundary layer catalytic recombination. 8th European Symposium on Aerothermodynamics for Space Vehicles. Lisbon, 2-6 March, 2015.

P. Barbante, A. Frezzotti, L. Gibelli: *A comparison of molecular dynamics and diffuse interface model predictions of Lennard-Jones fluid evaporation*. Proceedings of the 29th International Symposium on Rarefied Gas Dynamics, Xian, 13-18 July. AIP Conf. Proc. 1628, p. 893-900, 2014

A. Mazzetti, P. Barbante: *Object oriented techniques for the numerical simulation of combustion processes in hybrid rocket engines*. Proceedings of the 5th European Conference for Aeronautics and Space Sciences, Munich, 2013.

P. Barbante, L. Gibelli, P. Legrenzi, A. Frezzotti, A. Corigliano, A. Frangi: *A kinetic model for capillary forces in MEMS*. Proceedings of the 28th International Symposium on Rarefied Gas Dynamics, Zaragoza, 9-13 July, 2012. AIP Conf. Proc. 1501, 713-719, 2012.

P. Barbante, F. Franchi, F. Maggi, L. Galfetti: *Behaviour of thin paraffin liquid films in solid fuels for hybrid rocket propulsion*. 4th European Conference for Aerospace Sciences (EUCASS), 2011.

P. Barbante, A. Frezzotti, L. Gibelli, D. Giordano: *A kinetic model for collisional effects in dense adsorbed gas layers*. Proceedings of the 27th International Symposium on Rarefied Gas Dynamics, California, 10-15 July 2010. AIP Conf. Proc. Vol. 1333, 458-463 2011.

P. Barbante: *Heat flux duplication between ground facility and hypersonic flight*. J. of Thermophysics and Heat Transfer, Vol. 23 (4), 684-692, 2009.

P. Barbante: *How Diffusion Modeling affects Prediction of Heat Flux Loads*. Sixth European Symposium on Aerothermodynamics for Space Vehicles. Palais des Congrès - Versailles, France. 3-6 November 2008.

J. Thoemel, O. Chazot, P. Barbante: *Aspects of advanced catalysis modeling for hypersonic flows*. Proceedings of the Summer Program 2008. Centre for Turbulence Research, Stanford. 6 July-1 August, 2008.

P. Barbante: *Local Heat Flux Similarity between Hypersonic Flight and Plasma Wind Tunnel*. EUCASS 2007: 2nd European Conference for Aero-Spaces Sciences, Bruxelles, Belgium, 1-6 July 2007.

J. Baumgart, T. Magin, P. Barbante: *Calculation of Transport Properties for Entry into Martian Atmosphere*. ICCFD: The Fourth International Conference on Computational Fluid Dynamics, Ghent, Belgium, 10-14 July 2006.

P. Barbante, O. Chazot: *Flight Extrapolation of Plasma Wind Tunnel Stagnation Region Flowfield*. Journal of Thermophysics and Heat Transfer, Vol. 20 (3), 493-499, 2006.

P. Barbante: *Reacting Flows Simulation with Applications to Ground to Flight Extrapolation*. RTO-AVT-VKI, February 6-10 2006.

P. Barbante, T. Magin: *Fundamentals of hypersonic flight: properties of high temperature*

gases. Critical Technologies for Hypersonic Vehicle Development. RTO-AVT-VKI 116, May 10-14 2004.

G. Degrez, D. Vanden Abeele, P. Barbante, B. Bottin: *Numerical Simulation of Inductively Coupled Plasma Flows under Chemical Nonequilibrium*. International Journal of Numerical Methods for Heat and Fluid Flow. Vol. 14, No. 4, 2004.

P. Barbante, B. Bottin, M. Carbonaro, O. Chazot, G. Degrez, D. Vanden Abeele: A decade of aerothermal plasma research at the von Karman Institute. Contributions to Plasma Physics. vol. 44, pp. 472-477, 2004.

P. Barbante, G. Degrez, G.S.R. Sarma: *Computation of Nonequilibrium High Temperature Axisymmetric Boundary Layer Flows*. Journal of Thermophysics and Heat Transfer, Vol. 16, No. 4, 2002.

P. Barbante: *Accurate and Efficient Modelling of High Temperature Nonequilibrium Air Flows*. Ph.D. Thesis. Université Libre de Bruxelles and von Karman Institute. May 2001.

P. Barbante, O. Chazot, G. Degrez: *Flight extrapolation of wind tunnel data for the determination of TPS materials catalycity*. 2nd International Symposium on Atmospheric Re-entry Vehicles and Systems, Arcachon, France, March 26-29 2001.

P. Barbante, G. Degrez: *An efficient Euler/Navier-Stokes Solver for Reacting Flows*. 16th IMACS World Congress, 21-25 August 2000, Lausanne, Suisse.

P. Barbante, G. Degrez and G.S.R. Sarma: *Nonequilibrium High Temperature Boundary Layers around Bodies of Revolution*. AIAA Summer Conferences, 19-22 June 2000, Denver, Co USA

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P. Barbante, D. Vanden Abeele, B. Bottin, G. Degrez: *Numerical Simulation of High Temperature Non-Equilibrium Flows at the von Karman Institute*. First Joint French-German Symposium on Simulation of Atmospheric Entries by Means of Ground Test Facilities, 17-19 November 1999, Stuttgart, Germany.

B. Bottin, P. Barbante: *Efficient Fully Implicit Equilibrium Finite Volume Model of Induction Plasma Tunnels*. 30th Plasmadynamics and Lasers Conference 28 June- 1 July 1999 Norfolk, Va, USA.

D. Vanden Abeele, P. Barbante, G. Degrez, J.P. Mellado: *Numerical Simulation of Multi-Component Inductive Plasma Flows under Chemical Non Equilibrium*. Plasma 99, Heat and Mass Transfer under Plasma Conditions, Antalya, Turkey, 19-23 April 1999.

D. Vanden Abeele, B. Bottin, G. Degrez, P. Barbante, G.S.R. Sarma: *Physico-chemical Modeling for Computational Studies of High-Reacting Flows in an Inductive Plasma Wind Tunnel*. 15th IMACS World Congress 97, Berlin, Germany.

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Phone: 0039 02 23994563
e-mail: paolo.barbante@polimi.it

Current position

February 2005- Assistant Professor, Politecnico di Milano, Dip. di Matematica.

Post-doc grants

2001-2005: Post-doc fellow, Dept. of Mathematics, Politecnico di Milano.
September 2001-January 2005.

Education

2001: Université Libre de Bruxelles, Belgium. Ph.D. in Applied Sciences.

1996: von Karman Institute for Fluid Dynamics, Rhode-St-Genèse,
Belgium. Diploma Course in Fluid Dynamics. von Karman Prize
for the best student.

1996: Politecnico di Milano. Master Degree in Aeronautical Engineering.

Teaching

2017-2018: Teacher of Meccanica Razionale (Classical Mechanics). Civil and
Environmental Engineering. Politecnico di Milano, Lecco Campus.

2017-2018: Tutorials for the course Combustion Processes in Thermochemical
Propulsion, Aeronautical Engineering. Politecnico di Milano.

2016-2017: Teacher of Meccanica Razionale (Classical Mechanics). Civil and
Environmental Engineering. Politecnico di Milano, Lecco Campus.

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2010-2011: Teacher of Meccanica Razionale (Classical Mechanics). Civil and Environmental Engineering. Politecnico di Milano, Lecco Campus.

2009-2010: Teacher of Meccanica Razionale (Classical Mechanics). Civil and Environmental Engineering. Politecnico di Milano, Lecco Campus.
2009-2010: Tutorials for the course Meccanica Razionale (Classical Mechanics). Building Engineering. Politecnico di Milano.

2008-2009: Teacher of Meccanica Razionale (Classical Mechanics). Civil and Environmental Engineering. Politecnico di Milano, Lecco Campus.
2008-2009: Tutorials for the course Meccanica Razionale A (Classical Mechanics). Biomedical Engineering. Politecnico di Milano.

2007-2008: Teacher of Meccanica Razionale (Classical Mechanics). Aerospace Engineering. Politecnico di Milano.
2007-2008: Tutorials for the course Meccanica Razionale A (Classical Mechanics). Biomedical Engineering. Politecnico di Milano.

2006-2007: Teacher of Meccanica Razionale (Classical Mechanics). Aerospace Engineering. Politecnico di Milano.
2006-2007: Tutorials for the course Meccanica Razionale A (Classical Mechanics). Biomedical Engineering. Politecnico di Milano.

2005-2006: Teacher of Meccanica Razionale (Classical Mechanics). Mechanical Engineering. Politecnico di Milano.
2005-2006: Tutorials for the course Meccanica Razionale A (Classical

- Mechanics). Biomedical Engineering. Politecnico di Milano.
- 2004-2005: Tutorials for the course Meccanica Razionale (Classical Mechanics). Aerospace Engineering. Politecnico di Milano.
- 2003-2004: Tutorials for the course Meccanica Razionale (Classical Mechanics). Aerospace Engineering. Politecnico di Milano.
- 2002-2003: Tutorials for the course Meccanica Razionale (Classical Mechanics). Aerospace Engineering. Politecnico di Milano.
- 2001-2002: Tutorials for the course Meccanica Razionale (Classical Mechanics). Aerospace Engineering. Politecnico di Milano.

Research activity

- Modeling and simulation of hypersonic reacting flows.
- Heterogeneous catalysis for hypersonic flows.
- Turbulent combustion.
- Modeling and simulation of hybrid rocket engines.
- Kinetic theory of dense gases.
- Diffuse interface models for the evaporation of liquid films.

Publications

G. Bellas-Chatzigeorgis, P. Barbante, T. Magin: *Development of catalytic and ablative gas-surface interaction models for the simulation of reacting gas mixtures*. 23rd AIAA Computational Fluid Dynamics Conference, 5-9 June 2017, AIAA Paper 4499-2017.

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