Short CV

1. <u>Name and surname</u>   **Paolo DI BARBA**

2. <u>Date and place of birth</u>:   21 June 1963, Albenga (Italy)

3. <u>Citizenship</u>:   Italian

4. <u>Address</u>

Job: Dept of Electrical, Computer and Biomedical Engineering
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5. <u>Education</u>

Master of Science in Electronic Engineering (with honours), University of Pavia, 1988
PhD in Electrical Engineering, Lodz University of Technology, Poland, 2003
DSc in Electrical Engineering, Lodz University of Technology, Poland, 2013

6. <u>Career</u>

University of Pavia	Researcher	1/4/1991- 31/3/1994
University of Pavia	Senior researcher	1/4/1994- 31/10/1998
University of Pavia	Associate professor	1/11/1998- 30/9/2002
University of Pavia	Full professor	1/10/2002 on
Lodz Univ. of Technology	Visiting professor	1/10/2013 on

7. <u>Scientific and academic profile</u>

In the year 2002, Paolo Di Barba was appointed as a full professor of electrical engineering (tenure track position) at the University of Pavia, where he currently teaches various courses (at both BSc and MSc levels) in the following areas:
- circuit theory;
- field theory;
- principles and applications of electrical engineering;
- numerical models for electricity and magnetism.

At the time being, he is the head of the doctoral school in Electronics, Computer Science and Electrical Engineering, University of Pavia.

He is a member of the steering committee of the Research Centre for the History of Electrical Technology, University of Pavia.

He is responsible of the Electromagnetic Device CAD Laboratory at the Department of Electrical, Computer and Biomedical Engineering, University of Pavia, where he currently leads a group of young scientists active in the area of computational electromagnetics.

His scientific interests are focused on the analysis and synthesis of electric and magnetic fields, with special emphasis on evolutionary algorithms for inverse problems and optimisation. Main applications include computer-aided design of electromagnetic and electromechanical devices.

In this area, he has been one of the pioneering researchers who contributed to transfer the theory of Pareto optimality from classical microeconomics to computational electromagnetics.

More recently, he has been involved in the study of coupled-field inverse problems, characterized by magnetic and thermal domains: it is a multidisciplinary subject of research, rapidly growing e.g. in the area of clinical hyperthermia for oncological therapies.

As far as publications are concerned, he is author or co-author of more than 150 papers, presented to international conferences or published in international journals.

In particular, he is the author of the monograph entitled "Multiobjective Shape Design in Electricity and Magnetism" (Springer, 2010) and a co-author of the textbook entitled "Field Models in Electricity and Magnetism" (Springer, 2008).

He is an associate editor of the IEEE Transactions on Magnetics – Conferences.

He has been guest editor of special issues of international journals, and also invited speaker of international conferences.

He is a member of the steering committee of international symposia in the area of computational electromagnetism, in particular:

- Intl Symposium on Electromagnetic Fields in Electrical Engineering (ISEF),
- Workshop on Optimization and Inverse Problems in Electromagnetism (OIPE).

He is a member of the editorial board of COMPUMAG (Conference on the Computation of Electromagnetic Fields), a major international forum of the electromagnetic community.

He regularly acts as a reviewer for various international journals, like e.g.:

- *International Journal of Applied Electromagnetics and Mechanics - IJAEM*;
- *International Journal for Computation and Mathematics in Electrical and Electronic Engineering - COMPEL*;
- *IEEE Transactions on Magnetics.*

He contributes to research projects in cooperation with various international institutions, in particular:
- Institute of Mechatronics and Information Systems, Lodz University of Technology;
- Faculty of Electrical Engineering at the West Pomeranian University of Technology in Szczecin;
- Ecole Centrale de Lille, Lab. d'Electrotechnique et d'Electronique de Puissance ;
- Dipartimento di Ingegneria Industriale, Università degli Studi di Padova.

In the year 2009, he was an invited professor at the West Pomeranian University of Technology in Szczecin, and also at the Lodz University of Technology.
In the year 2010, he was an invited professor at the Académie de Lille – Université d'Artois.
In the academic year 2009-2010 he was a visiting professor at the University of Padova.
In the year 2011, he was an invited professor at the Lodz University of Technology.

At the University of Pavia he is the local coordinator of a granted TEMPUS project, the scope of which is to implement a new Master of Engineering in Microsystem Design at four technical universities in Ukraine, i.e. Donetsk. Kiev, Kharkov, and Lviv; the other partners are the Lodz University of Technology, the Technical University of Ilmenau, and the INSA-Lyon.

He has been a member of the IEEE Society since the year 1995, as well as a member of the International Compumag Society since its very beginning (year 1995).

He is a scientific consultant of Infolytica Corporation (Montreal, Canada) for the development of a code devoted to the automated optimal design of electromagnetic devices, based on the finite-element method for the field analysis. This was a major project of know-how transfer from university to industrial world.

He is a scientific consultant of the ABB Corporate Research Centre (Baden, Switzerland) in the area of thermal and dielectric design of power transformers.

He has been a member of the board ruling "Fondazione Collegio Santa Caterina da Siena", Pavia, as a representative of the Italian Ministry of University, Pavia, i.e. one the institutions belonging to the network of university residences, the mission of which is to promote the excellence of students in their education.

Last update: July 2017

This author's *h*-index is 12
The *h*-index is based upon the number of documents and number of citations.
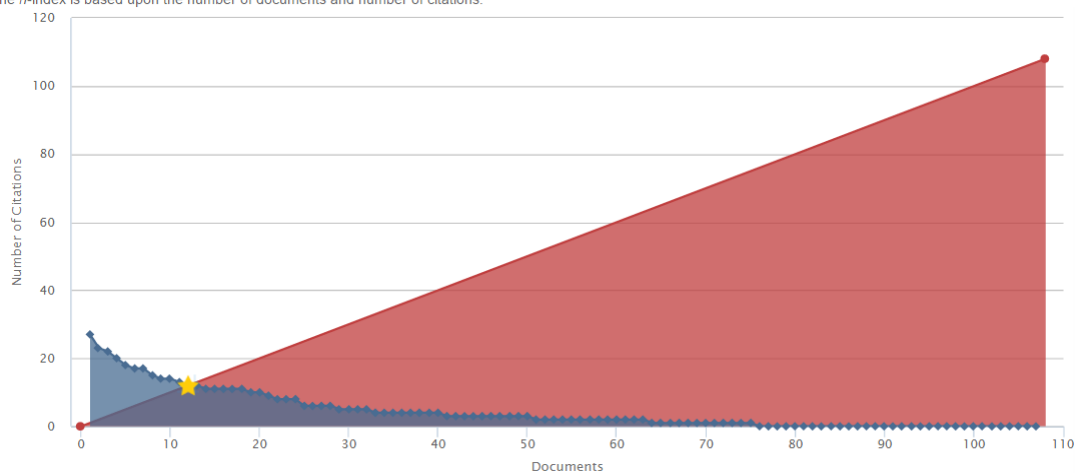
Note: Scopus is in progress of updating pre-1996 cited references going back to 1970. The *h*-index might increase over time.

Citation index: 476

List of main publications in the period 2011-2016

International journals with referees (journals indexed in ISI Journal Citation Reports)

[1] P. Di Barba, F. Dughiero, E. Sieni, A. Candeo, "Coupled Field Synthesis in Magnetic Fluid Hyperthermia", IEEE Trans. on Magnetics, vol. 47, pp. 914-917, 2011.

[2] P. Di Barba, F. Dughiero, E. Sieni, "Synthesizing a nanoparticle distribution in magnetic fluid hyperthermia", The international journal for computation and mathematics in electrical and electronic engineering – COMPEL, vol. 30, no. 5, 2011, pp. 1507-1516.

[3] P. Di Barba, "Remarks on optimal design methods in electromagnetics", ICS Newsletter, vol. 18, no. 2, July 2011. *Invited paper from the International Compumag Society*.

[4] Komeza, K.; Napieralska-Juszczak, E.N.; Di Barba, P.; Napieralski, P.; Lecointe, J.P.; Hihat, N., Using the FEM Meshes Adaption and Genetic Algorithms for Identification of Permeability in Normal Direction of Anisotropic Sheets, IEEE Transactions on Magnetics, Volume 48 , Issue 2, pp. 211 - 214, 2012.

[5] Komeza, K., Napieralska Juszczak, E., Napieralski, P., Di Barba P., "Coupling of the evolution strategy algorithm and genetic algorithm with finite element mesh adaptation", Compel, vol. 31, no. 3, pp. 1396 – 1407, 2012.

[6] P. Di Barba, K. Komeza, E. Napieralska-Juszczak, J. Ph. Lecointe, P. Napieralski, N. Hihat. "Coupling field calculation with optimization method using multiprocessor parallel computation". IET Science, Measurement and Technology (SMT),vol 6. Issue 5, 2012

[7] P. Di Barba, A. Savini, "Optimal shape design with field subdomains modeled by Thévenin equivalent conditions", Compel, vol.31, no.3, pp. 780-791, 2012.

[8] P. Di Barba, F. Dughiero, E. Sieni, «Synthesizing Distributions of Magnetic Nanoparticles for Clinical Hyperthermia», *IEEE Transactions on Magnetics*, vol. 48, n°. 2, pagg. 263–266, 2012.

[9] Paolo Di Barba, Fabrizio Dughiero, Elisabetta Sieni "Field synthesis for the optimal treatment planning in Magnetic Fluid Hyperthermia", Archives of Electrical Engineering, vol 61, pp. 57-67, 2012.

[10] P. Di Barba, F. Dughiero, E. Sieni, Non-parametric optimal shape design of a magnetic device for biomedical applications, COMPEL: The International Journal for Computation and Mathematics in Electrical and Electronic Engineering, vol. 31, pp.1358 – 1367, 2012.

[11] P. Di Barba, F. Dughiero, M. Dusi, M. Forzan, M. E. Mognaschi, M. Paioli, E. Sieni, «3D FE analysis and control of a submerged arc electric furnace», *International Journal of Applied Electromagnetics and Mechanics*, vol 39, no. 1, pp. 555–561, 2012.

[12] L.G. Campana, P. Di Barba, F. Dughiero, C.R. Rossi, E. Sieni, "Optimal Needle Positioning for Electrochemotherapy: a Constrained Multiobjective Strategy", *IEEE Transactions on Magnetics,* 49(5), pp 2141 – 2144, 2013.

[13] P. Di Barba, Yu. Pleshivtseva, E.Rapoport, M. Forzan, S. Lupi, E. Sieni, B. Nacke, A. Nikanorov, "Multi-objective optimization of induction heating processes: methods of the problem solution and examples based on benchmark model", Int. Journal of Microstructure and Materials Properties – IJMMP, vol.8, no.4/5, pp.357-372, 2013.

[14] Di Barba P, Dughiero F, Sieni E., "Parameter-free Paretian Optimisation in Electromagnetics A Kinematic Formulation", IET SCIENCE, MEASUREMENT & TECHNOLOGY, vol.7, no.2, pp.93-103, 2013.

[15] P. Di Barba, F. Dughiero, M. Forzan, E. Sieni , Parametric vs non-parametric optimal design of induction heating devices, International Journal of Applied Electromagnetics and Mechanics 44 (2014) 193–199.

[16] P. Di Barba, F. Dughiero, M. Forzan, E. Sieni. "A paretian approach to optimal design with uncertainties: application in induction heating", IEEE Trans Magn, 50, pp.917–920, 2014.

[17] P. Di Barba, M. Forzan, E. Sieni, "Multi-objective design of a power inductor: a benchmark problem of inverse induction heating", COMPEL, vol.33, no.6, pp. 1990-2005, 2014.

[18] Di Barba, P., Dolezel, I., Mognaschi, M.E., Savini, A., Karban, P.
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[19] Di Barba, P., Dolezel, I., Karban, P., Kus, P., Mach, F., Mognaschi, M.E., Savini, A.
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[20] Mognaschi, M.E., Di Barba, P., Magenes, G., Lenzi, A., Naro, F., Fassina, L.
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[21] P. Di Barba, A. Savini, S. Wiak, "Minimizing design criterion and sensitivity: cost-effective evolutionary approach with application in mechatronics", International Journal of Applied Electromagnetics and Mechanics 46 (2014) 335–340.

[22] Yu. Pleshivtseva, P. Di Barba, E. Rapoport, B. Nacke, A. Nikanorov, M. Forzan, S. Lupi, E. Sieni, "Multi-objective optimization of induction heaters design based on numerical coupled fields analysis", Intl Journal of Microstructure and Materials Properties – IJMMP, vol.9, no.6, 2014. DOI 10.1504/IJMMP.2014.067318.

[23] Januszkiewicz, L., Di Barba, P., Hausman, S.
Automated identification of human-body model parameters
(2015) International Journal Of Applied Electromagnetics And Mechanics, 51 (S1), pp. S41-S47.
DOI: 10.3233/JAE-2009

[24] Bressan, F., Dughiero, F., Bullo, M., Di Barba, P.
Efficiency optimization of a two-port microwave oven: A robust automated procedure
(2015) COMPEL-The International Journal for Computation and Mathematics in Electrical and Electronic Engineering, 34 (4), pp. 1213-1228.
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[25] Roberta Bertani, Flavio Ceretta, Paolo Di Barba, Michele Forzan, Fabrizio Dughiero, R. Michelin, Paolo Sgarbossa, Elisabetta Sieni, F. Spizzo, "Optimal Inductor Design for Nanofluid Heating Characterisation", *Engineering Computation*, Vol. 32, Issue 7, pp.1870 – 1892, 2015, DOI 10.1108/EC-10-2014-0218.

[26] P. Di Barba, F. Dughiero, M. Forzan, E. Sieni "Improved solution to a multi-objective benchmark problem of inverse induction heating", *International Journal of Applied Electromagnetics and Mechanics*, vol. 49, no. 2, pp. 279-288, 2015, DOI 10.3233/JAE-150023.

[27] P. Di Barba,F. Dughiero, M. Forzan, E. Sieni, "Sensitivity-based optimal shape design of induction-heating devices", *Science, Measurement & Technology, IET*, vol.9, no.5, pp.579-586, 8 2015, DOI 10.1049/iet-smt.2014.0227.

[28] Di Barba, P., Forzan, M., Sieni, E., "Multiobjective design optimization of an induction heating device: a benchmark problem", *International Journal of Applied Electromagnetics and Mechanics*, vol. 47, no. 4, pp. 1003-1013, 2015, DOI 10.3233/JAE-140108.

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[32] P. Di Barba and S. Wiak, "Evolutionary Computing and Optimal Design of MEMS", *IEEE Trans Mechatronics*, vol.20, no.4, 2015, pp.1660-1667.

[33] Sieni, E., Di Barba, P., Forzan, M.
Migration NSGA: method to improve a non-elitist searching of Pareto front, with application in magnetics
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[35] Di Barba, P., Dughiero, F., Forzan, M., Sieni, E.
Optimal design of inductors for magnetofluid hyperthermia by means of migrationassisted NSGA
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Multi-objective wind-driven optimisation and magnet design
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Field-based optimal placement of antennas for body-worn wireless sensors
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[39] Di Barba, P., Dughiero, F., Mognaschi, M.E., Savini, A., Wiak, S.
Biogeography-Inspired Multiobjective Optimization And MEMS Design
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DOI: 10.1109/TMAG.2015.2488982

[40] Di Barba, P., Mognaschi, M.E., Bonislawski, M., Palka, R., Paplicki, P., Piotuch, R., Wardach, M.
Hybrid excited synchronous machine with flux control possibility
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DOI: 10.3233/JAE-162190

[41] Di Barba, P., Mognaschi, M.E., Savini, A., Wiak, S.
Island biogeography as a paradigm for MEMS optimal design
(2016) International Journal Of Applied Electromagnetics And Mechanics, 51 (S1), pp. S97-S105.
DOI: 10.3233/JAE-2015

Current year papers (in progress)

[42] Di Barba, P., Dughiero, F., Forzan, M., Sieni, E.
Self-Adaptive NGSA algorithm and optimal design of inductors for magneto-fluid hyperthermia
(2017) COMPEL-The International Journal for Computation and Mathematics in Electrical and Electronic Engineering, 36 (2), pp. 535-545.
DOI: 10.1108/COMPEL-05-2016-0188

[43] Di Barba, P., Mognaschi, M.E., Lowther, D.A., Dughiero, F., Forzan, M., Lupi, S., Sieni, E.
A benchmark problem of induction heating analysis
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Higher-order multiobjective design of MEMS
(2017) International Journal of Applied Electromagnetics and Mechanics, 53 (S2), pp. S239-S247.
DOI: 10.3233/JAE-140165

Chapters of books

[45] E. Costamagna, P. Di Barba, M.E. Mognaschi, and A. Savini, "Fast algorithms for the design of complex-shape devices in electromechanics," in Computational Methods for the Innovative Design of Electrical Devices, Springer, 2010, pp. 59-86.

[46] P. Di Barba, "Basic principles of optimal design of electromagnetic devices and multi-objective optimization", ASM Handbook Induction Heating and Heat Treatment, vol.4c, pp. 359-365, ASM International, 2014.