



RESEARCH TOPICS

Title: POWER CONVERTER, ELECTRIC MACHINES AND DRIVES

The research activity of the group is devoted to the main fields of Electrical Engineering. The main thematic areas are: electric machines, power electronics and electric drives. The newest fields of research are devoted to fuel cells systems, electric power quality and high speed drives.

TOPICS:

- ☐ Active filters and power quality control
- ☐ Design of electrical machines
- ☐ Electric drives for electric, fuel cells and hybrid vehicles
- ☐ Electric drives for appliances
- ☐ Electric drives for high speed applications
- ☐ Energy saving in electrical machines and drives
- ☐ Magnetic material and their application in electrical machines
- ☐ Renewable Energy and distributed generation apparatus
- ☐ Thermal analysis of electrical machines

REFERENCE PROFESSOR(S)

☐ Aldo Boglietti (aldo.boglietti@polito.it)

Aldo Boglietti received his doctor degree (Laurea) in Electrical Engineering from the Politecnico di Torino in 1981. He joined the Electrical Engineering Department of the Politecnico di Torino as researcher in electrical machines and drives since 1 August 1984, and he is now full professor in the same Department. His research activity in the electrical machines and drive has involved the following fields:

- energetic problems in electrical machines with main supply (high efficiency motors)
- energetic problems in electrical machines with inverter supply (losses analysis, derating methodologies, energetic behavior of magnetic materials, etc.)

Prof. Boglietti experience on energetic problems in electrical machines and drives started with the Italian 'Progetti Finalizzati Energetica I and II' and it evolved on the same subjects taking into account much more specific problems, like magnetic materials and finite element method. Now the main research field is in the thermal problems analysis in electrical machines. The obtained results have been published in the most important journal at the international level, confirming the quality of the work done. Prof. Boglietti has coordinated several National research programme and he is author of more than 110 papers published on International journal and international conference records. Prof. Boglietti is reviewer of the following journals and proceedings: IEEE Transactions on Magnetics, IEE Proceeding Electric Power Applications, 'IEEE Industry Applications Society. Prof. Boglietti is Head of the Electrical Engineering Department of the Politecnico di Torino till 2011 and Secretary of the Electrical Machine Committee of the IEEE Industry Application Society. Prof. Boglietti is Associated Editor of IEEE Transaction on Industrial Electronics.

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☐ Radu Bojoi (radu.bojoi@polito.it)

Dr. Iustin Radu Bojoi received in 1993 the M.Sc. Degree in Electrical Engineering from the Technical University Iasi, Romania, and the Phd. in 2003 from Politecnico di Torino, Italy. Since 1994 to 2002 he was Assistant Professor in the Department of Electrical Drives and Industrial Automation from Technical University of Iasi. In 2004 he joined the Department of Electrical Engineering of the Politecnico di Torino as Assistant Professor in Electrical Machines, Drives and Power Electronics.

His scientific interest is related to electrical drives and power electronic conversion systems. In particular, the research work is focused on advanced control solutions for three-phase and multi-phase electrical drives and power conditioning systems. Dr. Bojoi experience and expertise is related to DSP and FPGA-based digital control boards (board design and programming) for electrical drives and power electronic systems, as well as dSPACE fast prototyping systems.

He published more than 40 papers in international conferences and journals and he is currently vice-chairman of the Appliance Industry Committee of the Industry Applications Society (IEEE-IAS).

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❑ **Andrea Cavagnino** (andrea.cavagnino@polito.it)

Andrea Cavagnino was born in Asti, Italy, in 1970. He received the M.Sc. in 1995 and the Ph.D. in 1999, both in Electrical Engineering from the Politecnico di Torino. From 1997 he is working in the Electrical Machines Laboratory of the Department of Electric Engineering of the Politecnico di Torino where he is now Assistant Professor. His fields of interest include electromagnetic design, thermal design and energetic behaviours of electric machines. He has authored more than 60 papers published in technical journals and conference proceedings. Dr. Cavagnino is IEEE Member and he is a reviewer for International Journals and Conferences in the field of interest. From 2007 he is an Associate Editor for the Electrical Machine Committee-IEEE Transactions on Industrial Applications.

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❑ **Mario Lazzari** (mario.lazzari@polito.it)

Mario Lazzari was born in Lucca, Italy, in 1945.

He was graduated in Electrical Engineering from the Politecnico di Torino in 1969.

He joined the Institute of Electrical Machines of the Politecnico di Torino in 1970.

From 1986 he is Full Professor of Electrical Machines in the Dept. of Electrical Engineering of the Politecnico di Torino.

His main research activity is centred in electrical machines and drives and involves the following themes:

- o Analysis of transients in electrical machines.
- o Analysis of energetic behaviour of electrical machines with main and static converters supply.
- o Sizing and design of electrical motors.

In these fields he was researcher and scientific responsible of many research programmes and is author of several papers published on International Journals and on International Conference Records.

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❑ **Francesco Profumo** (francesco.profumo@polito.it).

Francesco Profumo (M'88-SM'90) was born in Savona, Italy, in 1953. He graduated in Electrical Engineering from the Politecnico di Torino, Italy, in 1977. Since 1978 to 1984, he worked as Senior Engineer for the R&D Ansaldo Group in Genova (Italy). In 1984 he joined the Department of Electrical Engineering of the Politecnico di Torino, where he was is now Professor of Electrical Machines and Drives at Politecnico di Torino and Adjunct Professor at University of Bologna.

Since September 2003, Dr. Profumo was the Dean of the Engineering Faculty at the Politecnico di Torino and since October 2005 he is the Rector of the Politecnico di Torino.

He was Visiting Professor at the Department of Electrical and Computer Engineering of the University of Wisconsin-Madison (USA) in the years 1986-88, at the Department of Electrical Engineering and Computer Science of Nagasaki University (Japan) (years 1996-97, for one semester), at the Department of Electrical Engineering of Technical University of Prague (Czech Republic) (year 1999, one month) and at the Department of Electrical Engineering of Technical University of Cordoba (Argentina) (year 2004 and 2005, one month).

His fields of interest are power electronics conversion, high power devices, applications of new power devices, integrated electronic/electromechanical design, high response speed servo drives, new electrical machines structures, power conditioning systems for fuel cells applications. He published more than 230 papers in International Conferences and Technical Journals.

Dr.Profumo is an active member of the IEEE-IAS Drives Committee and he served as Chairman of the same Committee (2004-2005). He was also AdCom member of the IEEE PELS. He is member of the Technical Program Committee of several International Conferences in the Power Electronics and Motor Drives field and he was the Technical Co-Chairman of the PCC'02 in Osaka (Japan) in 2002.

Dr.Profumo won the IEEE-IAS second prize paper in 1991(USA) and in 1997 (USA), the IEEE-IAS first prize paper in 1992 (USA) and the JIEE-IPEC first prize paper in 2005 (JAPAN).

He was awarded by the *Signum Aureum Facultatis Mechanicae Universitatis Miskolciensis*, July 1, 2000, University of Miskolc (Hungary), by the *Honorary Professorship*, University of Cordoba (Argentina), August 11, 2004, by the *Honorary Doctor Degree*, Technical University of Riga (Latvia), October 12, 2006, by the *Honorary Doctor Degree*, Politechnica of Bucarest (Romania), June 15, 2007 and by the *Honorary Doctor Degree*, University of Miskolc (Hungary), June 26, 2007 and by the *Honorary Professorship*, Jiao Tong University, Xi An (Cina), September 11, 2007.

Dr.Profumo has been the Coordinator or partner of several Projects in the frame of the European Commission activities (Tempus, Comett, Joule, Human Capital and Mobility, Alfa, European Union S&T Grant Programme in Japan, Leonardo da Vinci) and he is the Coordinator of the "Hydrogen

Group" of the Politecnico di Torino.

He is Member of the Academy of Science in Italy (since 2007) and is a Registered Professional Engineer in Italy.

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❑ **Alberto Tenconi** (alberto.tenconi@polito.it)

Alberto Tenconi received the M. Sc. in 1986 and the PhD. in 1990, both in Electrical Engineering from the Politecnico di Torino, Torino, Italy. From 1988 to 1993, he worked for the Electronic System Division of FIAT Research Center, where he was engaged in the development of electrical vehicle drive systems. He then joined the Department of Electrical Engineering Politecnico di Torino where, from the year 2006, he is Full Professor. His fields of interest are high performance drives design, new power electronic devices applications, and non conventional electric machines development. In particular, the his experience concerns the development of both theoretical and experimental research activities mainly focussed on:

- development of models dedicated to the design, simulation performance computation on electrical/electronic/electromechanical systems and components;
- design of special electric machines based on unconventional technologies and materials;
- development (hardware e software) of new control systems for dedicated medium-high performances electric drives.

The research activity is documented by more than 110 papers published on International Journals and on International Conference Records. Furthermore, prof. Tenconi has participated, both as designer and as scientific responsible, at many Regional, National and European Research Programmes and at research contracts committed by industrial companies. Prof. Tenconi is IEEE Member and he is reviewers for International Journals, and Conferences in the field of interest.

[Web Page Prof. Tenconi](#)

INTERNATIONAL AND INDUSTRIAL COOPERATION

ACADEMIC COOPERATIONS

❑ **Europe:**

Aachen, Alborg, Munich, Trondheim, KTH, Warsaw, Lodz, Prague, Kosice, Budapest, Miskloc, Bucarest, Timisoara, Athens, Skopje, Belgrad, Tirana, Barcellona, Madrid, Nice, Marseille, Lisboa, Aveiro, Bath, Imperial College, Manchester, Trinity College, Glasgow

❑ **US and Canada:**

Madison, Georgia Tech, Ohio State, MIT, Purdue, A&M, Florida, Duke, North Carolina, Berkely, Edmonton.

❑ **Asia:**

Tokyo, Osaka, Nagasaki, Hokkaido, Fukuoka, Indian Institute of Technology, Jao Tong Xi'an, Jao Tong Shanghai, Tongji Shanghai, Tsinghua, Seoul National University

INDUSTRIAL COOPERATIONS

❑ **Europe:**

Motor Design Ltd UK, Varian SpA Italy, Centro Ricerche FIAT Italy, General Motors-PowerTrain Europe and several Italian SME Companies.

❑ **US and Canada:**

A. O. Smith Electrical Products Company USA, Whirlpool USA.

RESEARCH GROUP

PROFESSORS

- ☐ Aldo Boglietti
- ☐ Radu Bojoi
- ☐ Andrea Cavagnino
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- ☐ Paolo Ferraris
- ☐ Mario Lazzari
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- ☐ Francesco Profumo
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PH.D STUDENTS AND RESEARCH FELLOWS

- ☐ Leonardo Limongi
- ☐ Cesare Pica
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- ☐ Silvio Vaschetto
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REFERENCE PAPERS

Paper published on International Journals in the last 5 years

- [1] R. Bojoi, G. Griva, F. Profumo, L. Natale, "Shunt active power filter implementation for induction heating applications", *COMPEL*, Vol. 27, N. 2, February 2008.
- [2] A. Boglietti, A. Cavagnino, "Analysis of Endwinding cooling effects in TEFC Induction Motors", *IEEE Transactions on Industry Applications*, Vol. 43, N. 5, Sept.-Oct. 2007.
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- [8] R. Bojoi, F. Farina, F. Profumo, A. Tenconi, "Direct torque control with full order stator flux observer for dual-three phase induction motor drives", *IEEE Transactions on Industry Applications*, Vol. 126, N. 4, April 2006.
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