Nicola Bianchi
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Education

Nicola Bianchi took the Laurea Degree (as M.Sc. degree) in Electrical Engineering at the University of Padova in 1991, obtaining the full marks and praise. The final project dealt with the electromechanical analysis and design of a synchronous reluctance motor. The thesis was rewarded by AEI (Italian Electrical Association) with the award praise "Stefano e Flora Bodoni" for the new engineers in 1991.

Since 1991 he was a Ph.D. student at the same University. He received his Ph.D. degree in in Electrical Engineering in 1995, presenting a PhD Thesis titled "PM Motors for AC Drives: Electromagnetic Analysis and Innovative Design Procedures" (in italian).

Research Activity

Nicola Bianchi works at the Electric Drive Laboratory of the Department of Electrical Engineering. His research activity is in the field of analysis of the performance, the determination of the parameters and the development of design procedures for electrical motors, considering conventional and innovative machines, such as brushless motors, synchronous and switched reluctance motors, etc. Optimisation techniques have been adopted in the design procedures, together with finite element analysis of the electromagnetic fields in the electrical machines. The research can be classified into four main items:

1) *Analisys and design of electrical permanent magnet machines for civil and industrial applications,*
2) *Design of fault-tolerant and multiphase electrical machines,*
3) *Optimized design of electrical machines and drives, for hybrid electrical vehicles,*
4) *Analisys of synchronous motors operating in flux-weakening and sensorless mode.*

Referring to each of such items, Nicola Bianchi is authors of several papers in prestigious scientific journals, such as IEEE Transaction, IEE Proceeding, and presented in International Conference organized by IEEE, IEE, ICEM, etc. (about 140 technical papers).

Nicola Bianchi is recipient of two awards for best paper at International Conferences: first award at OPTIM 2000 conference and third award at IAS 2006 Annual Meeting.

Since 1998, he is an IEEE Member, Electric Machines Committee member and Electric Drive Committee member, with the duty of technical reviewer, session chair or session organizer.

Nicola Bianchi is a reviewer of scientific journal, among the other IEEE Trans. on IA, EC, PE, and IE (electrical machines and industrial drive committees) and EPE Journal. Since 2007, he is a member of the Editorial Board of the IEE-IET Proceedings, Electric Power Applications. Since 2008, he is an Associate Editor of the IEEE Trans. on Industry Applications, Electrical Machine Committee.

As far as the international relations are concerned, Nicola Bianchi was a visiting professor at the University of Glasgow, Leeds, Helsinki, Seoul and Stockolm. In addition, Nicola Bianchi was the organizer of seminars and workshops at the University of Padova, where authoritative Professors from other University were invited.

In the field of the scientific activity of the Electric Drive Laboratory, Nicola Bianchi takes part to several research projects between the Department of Electrical Engineering and local companies, and some foreign companies, concerning analysis and design of electrical motors and drives. In the same field, he is responsible for various projects for local and foreign industries.

Nicola Bianchi is author and co-author of about 140 scientific publications. He is author of the book "*Electrical Machine Analysis using Finite Elements*", published by CRC Press, Taylor & Francis Group, 2005, and co-author of the books "*Design, Analysis, and Control of Interior PM Synchronous Machines"* and "*Theory and Design of Fractional-Slot PM Machines*", tutorial course notes presented at IEEE IAS 2004 and IEEE IAS 2007 annual meeting, respectively.

Teaching

Since 1995 up to 1997, Nicola Bianchi was the lecturer of "Electric Drives for Automation" at the Faculty of Engineering of the University of Udine, as contract professor. Since 1996, he was a postdoctoral researcher in Industrial Engineering at University of Padova. Since 1998, he joined the Electric Drives Laboratory at the Department of Electric Engineering of the University of Padova, as a Assitant Professor. Since 2005, Nicola Bianchi is an Associate Professor at the same University.

His teaching activity deals with the "Design Methods of Electrical Machines", where he introduced the finite element analysis. In the course, basic concepts of analysis and design of conventional electrical machines (transformers, induction motors, synchronous alternators) and machines supplied by static converters (brushless and synchronous reluctance motors). He organises a laboratory of finite element analysis of electrical machines, for the undergraduate students. He is Tutor of different students for their final project.

In addition, Nicola Bianchi is a lecturer of "Electrical Machines and Drives" for Aerospace Engineering. The course includes basic principles of electrical machines, static power converters and control algorithms of electrical drives. Fault tolearnt motors and multiphase systems are also delat with. He is also involved in short seminars in the courses "Vibrations and Vehicle Control" and "Mechanical System Design", teaching about the electrical machine structures and control laws, together the fundamental structures of hybris electrical vehicles. He is also the lecturer of "Permanent Magnet Motor Drives" for the Ph.D. students of Industrial Engineering.

Finally, he promoted Socrates-Erasmus links with some European Universities, such as Leeds, Glasgow, Helsinki, and Oviedo, and international links with some extra-European Universities, such as Seoul, Conception.

Recent Pubblications

[1] Nicola Bianchi and Silverio Bolognani, "Influence of Rotor Geometry of an IPM Motor on Sensorless Control Feasibility", in *IEEE Trans. on Industry Applications*, Vol. **43**, No. 1, Jan./Feb. 2007, pp.87-96.

[2] Nicola Bianchi, Silverio Bolognani, Michele Dai Pré, Matteo Tomasini, Luca Peretti, and Mauro Zigliotto, "The Steering Effect - PM Motor Drives for Automotive Systems", in *IEEE Magazine on Industry Applications*, Vol. **14**, No. 2, March 2008, pp.40-48.

[3] Nicola Bianchi and Michele Dai Pre', "Use of the star of slots in designing fractional-slot single-layer synchronous motors", in *IEE Proc., Electric Power Applications*, (online EPA no. 2005-0284), Vol.**153**, No.3, May 2006, pp. 459-466.

[4] Nicola Bianchi, Silverio Bolognani, Ji-Hoon Jang, and Seung-Ki Sul, "Comparison of PM Motor Structures and Sensorless Control Techniques for Zero-Speed Rotor Position Detection", in *IEEE Trans. on Power Electronics*, Vol. **22**, No. 6, Nov. 2007, pp.2466-2475.

[5] Nicola Bianchi, Silverio Bolognani, Michele Dai Pré, "Strategies for the Fault-Tolerant Current Control of a Five-Phase Permanent-Magnet Motor", in *IEEE Trans. on Industry Applications*, Vol. **43**, No. 4, July/August 2007, pp.960-970.

[6] Nicola Bianchi, Silverio Bolognani, Michele Dai Pre', "Magnetic Loading of Fractional-Slot Three-Phase PM Motors with Nonoverlapped Coils", in *IEEE Trans. on Industry Applications*, Vol. **44**, No. 5, Sept./Oct. 2008, pp. 1513-1521.

[7] Nicola Bianchi, Silverio Bolognani, Diego Bon, and Michele Dai Pré, "Torque Harmonic Compensation in a Synchronous Reluctance Motor", in *IEEE Trans. on Energy Conversion*, Vol. **23**, No. 2, June 2008, pp. 466-473.

[8] Nicola Bianchi, Silverio Bolognani, Ji-Hoon Jang, Seung-Ki Sul, "Advantages of Inset PM Machines for Zero-Speed Sensorless Position Detection", in *IEEE Trans. on Industry Applications*, Vol. **44**, No.4, July/August 2008, pp. 1190-1198.

[9] Luigi Alberti, Nicola Bianchi and Silverio Bolognani, "A Very Rapid Prediction of IM Performance Combining Analytical and Finite-Element Analysis", in *IEEE Trans. on Industry Applications*, Vol. **44**, No. 5, Sept./Oct. 2008, pp.1505-1512 .

[10] Nicola Bianchi, Silverio Bolognani and Michele Dai Pré, "Impact of Stator Winding of a Five-Phase Permanent Magnet Motor on Post-Fault Operations", in *IEEE Trans. on Industry Electronics*, IE, Vol. **55**, No. 5, May 2008, pp. 1978-1987.

[11] Luigi Alberti, Nicola Bianchi, and Silverio Bolognani, "A coupled thermal-magnetic analysis for a rapid and accurate prediction of IM performance", in *IEEE Trans. on Industry Electronics*, IE, Vol. **55**, No. 10, October 2008, pp. 3575-3582.