

CURRICULUM VITAE

Univ.-Prof. Dr.-Ing. Petar J. Grbović



Affiliation: Full Professor
University of Innsbruck,
Institute of Mechatronics,
Innsbruck Power Electronics Lab. (*i-PEL*)

2nd Affiliation: Scientific Committee Member,
Center of Power Electronics and Drives (*C-PED*),
Roma TRE University, Italy

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PERSONAL DATA

Date of birth: 10th of February 1971
Place of birth: Čajetina, Republik of Serbia
Nationality: Serbian

EDUCATION

- Ph.D (October 2007–July 2010)
 - **Dissertation: “Ultra-capacitor Based Regenerative Energy Storage and Power Factor Correction Device for Controlled Electric Drives”**
Laboratoire d’Électrotechnique et d’Électronique de Puissance de Lille, l’Ecole Centrale de Lille, France.
- M. Sc.E.E. (2 years program, May 2005)
 - **Master thesis: “Development of a Mini-Inverter for Tesla Induction Motor,”**
The School of Electrical Engineering, University of Belgrade, Serbia.
- Dipl. Ing. (5 years program, March 1999)
 - **Diploma thesis: “Series Resonant DC-DC Converter with Reduced Power Losses,”** The School of Electrical Engineering, University of Belgrade, Serbia.

EMPLOYMENT & PROFESIONAL ACTIVITES

November 2018 - Present

Full Professor
Innsbruck Power Electronics Laboratory (*i-PEL*), Institute of Mechatronics,
University of Innsbruck, Innsbruck, Austria

March 2017-Present

Scientific Committee Member
Center of Power Electronics and Drives (C-PED)
University Roma TRE, Rome, Italy

September 2011-October 2018

Senior Expert
HUAWEI Technologies Düsseldorf GmbH
Power Conversion Technology Lab (PCTL), Nuremberg/Munich, Germany

September 2010-August 2011

Lead Engineer/Technologist
GE Global Research, Munich, Germany

April 2005-July 2010

Power Electronics Group Expert
Schneider Electric (Schneider Toshiba Inverter), Pacy Sur Eure, France

March 2003-April 2005

R/D Engineer
PDL Electronics Ltd, (a division of Schneider Electric SAS, France), Napier, New Zealand

2001-November 2002

R&D Consulting engineer
CE. SET Italy (a division of Emerson Appliance Motors Europe), Asti, Italy

October 1999-January 2003

R&D Consulting Engineer
RDA Co, Jase Prodanović 4, Belgrade, Serbia

October 1999-January 2003

Research Engineer
Ministry of Science and Technology of Republic of Serbia and The School of Electrical Engineering, Belgrade, Serbia

ON-GOING R&D PROJECTS

[PR 1] 5-Level Power Converter for LV STATCOM Applications.

- Configuration 3-phase 4-wire, Rated power 30kVAR, Efficiency 99.3%, Specific Power: 1.2 kVAR/kg with Natural Cooling & 4 kVAR/kg with Air Forced Cooling.

[PR 2] GSM/GPRS Communication & Control Device for Remote Monitoring & Control.

COMPLETED R&D PROJECTS

University Research Projects:

[PR 3] 5-Level T Type Rectifier for Automotive Applications

Industrial/Academia Research Projects:

[PR 4] 5-Level E-Type 3-Phase Back to Back Power Converter for UPS Applications,

- Collaboration research project with University Roma TRE, Rome, Italy
- New concept and topology for double conversion UPS converter, Efficiency 98.5% and Specific Power 2.5kVA/kg.

[PR 5] Resonant Switched Capacitor Converters,

- Collaboration Research project with CEI, University Politechnique de Madrid, Spain,
- New concept and topology for dc/dc converter, 15kW, Efficiency 99.5%, Power Density 50kW/dm³ and Specific Power 25kW/kg.

[PR 6] Study of PSiP Brick and its Application in High Efficiency/Density Power Converters,

- Collaboration Research project with Fraunhofer Institute IZM, Berlin
- New concept and topology for isolated dc/dc converter, 1.8kW, Power Density 175kW/dm³.

[PR 7] Ultra-capacitor Based Regenerative Energy Storage and Power Factor Correction Device for Controlled Electric Drives

- Collaboration Research project with Laboratoire d'Électrotechnique et d'Électronique de Puissance de Lille, l'École Centrale de Lille, France,
- New concept of variable speed drives with ultra-capacitor energy storage.

Industrial Research Projects:

[PR 8] Next Generation Back to Back AC/DC Topology and Concept.

[PR 9] 6-Cell & 3-Level Double Conversion Power Converter.

[PR 10] High Power Inter-cell Transformers & Interleaved Power Converters.

[PR 11] Universal Advanced Active Gate Driver (UAAGD) for High Power IGBTs.

[PR 12] Ultra-efficient Power Converters for PV Applications.

[PR 13] New Generation of Ultra-efficient Power Converters for UPS Applications.

Development Projects:

[PR 14] High Power Inter-cell Transformers & Interleaved Power Converters.

[PR 15] MV 3-Level Converter for Grid Connected Applications.

[PR 16] Thermal Protection of Large IGBT Modules.

[PR 17] Compact and Low Cost Auxiliary Power Supply for 690V Three-phase Supplied Power Converters.

[PR 18] Low Cost PFC for Single Phase Supplied Variable Speed Drives.

[PR 19] Active Gate Driver for 600/1200V IGBTs.

[PR 20] Auxiliary Power Supply for Home Appliances.

[PR 21] High Voltage High Precision Programmable ac Voltage Supply (5kV, 100mA, 50Hz).

[PR 22] IGBT Based Series Resonant Power Converter for Telecom Applications (54V, 10A, 400kHz).

[PR 23] Mini Inverter for Tesla Induction Motors for General Purpose Variable Speed Drives,

[PR 24]Power Converter for Small Fork Lift Traction Drives.

RESEARCH INTEREST

- Advanced power conversion concept: High performance optimization and integration of switching mode power converters,
- Application, control and driving techniques for advanced power semiconductor devices: IGBT, RB-IGBT, MOSFET, SiC JFET, SiC MOSFET, GaN....
- Power converter topologies: State of the art voltage and current source topologies, multi-cell interleaved converters, high power isolated dc-dc converters,
- Advanced energy storage devices (ultra-capacitors and batteries) and applications in power conversion systems,
- Application of power converters: Variable speed drives, bidirectional rectifiers, active filters, UPS Converters and STATCOM devices,
- Control of power converters: Pulse width modulation (carrier based continuous and discontinuous modulation schemes), the current control (standard α/β and dq frame), dc side control (full and partial dc bus voltage and current control in dc-dc converters), active damping of ac and dc side variables.

Rewards and Publications

Rewards: (1)

Petar J. Grbović, “Concept of Integrated Industrial AC Drives”, the First Prize of Belgrade Chamber of Commerce, 2001. For the most advanced technical solution in the field of power electronics and variable speed drives.

Books: (1+1)

- [B 1] **Petar J. Grbović**, “Ultra-capacitors in power conversion: Analysis, Modeling and Design from Theory to Practice”, Wiley-IEEE Press; 1st edition (December 16, 2013), ISBN-13: 978-1118356265
- [B 2] **Petar J. Grbović**, “Multi-Level and Multi-Cell Power Converters: A Way to go Beyond the Limits”, (to be published).

Transactions and Journals: (17)

- [J 1] Marco Di Benedetto, Alessandro Lidozzi, **Petar J. Grbović**, Luca Solero and Fabio Crescimbin, “Low Volume and Low Weight 3-Phase 5-Level Back to Back E-Type Converter”, *IEEE Trans. Industry Applications*, Early access, 10.1109/TIA.2019.2928508.
- [J 2] Marco Di Benedetto, Alessandro Lidozzi, **Petar J. Grbović**, Luca Solero and Fabio Crescimbin, “Five-Level E-Type Inverter for Grid-Connected Applications”, *IEEE Trans. Industry Applications*, Vol. 54, No.5, pp. 5536-5548, September-October 2018.
- [J 3] Marco Di Benedetto, Alessandro Lidozzi, **Petar J. Grbović**, Luca Solero and Fabio Crescimbin, “Low Frequency State-Space Model for the Five-Level Unidirectional T-Rectifier”, *IEEE Trans. Industry Applications*. Vol. 53, No.2, pp. 1127-1137, March-April 2017.
- [J 4] Marco Di Benedetto, Alessandro Lidozzi, **Petar J. Grbović**, Luca Solero and Fabio Crescimbin, “Small Signal Model of the Five-Level Unidirectional T-Rectifier”, *IEEE Trans. Power Electronics*, Vol. 32, No.7, pp. 5741-5751, July 2017.

- [J 5] **Petar J. Grbović**, Fabio Crescimbin, Alessandro Lidozzi and Luca Solero, "5-Level Unidirectional T-Rectifier for High Speed Gen-Set Applications," *IEEE Trans. on Industry Applications*, Volume: 52, Issue: 2, March-April 2016.
- [J 6] **Petar J. Grbović**, "Art of Control of High Power IGBTs: From Theory to Practice -An Overview-," *Advances in Power Electronics*, Vol. 46, No. 12, pp.8-18, China, December 2012.
- [J 7] **Petar J. Grbović**, Philippe Delarue and Philippe Le Moigne, "The Ultra-capacitor Based Regenerative Controlled Electric Drives with Power Smoothing Capability," *IEEE Trans. Industrial Electronics*, Vol.59, No. 12, pp.4511-4522, December 2012.
- [J 8] **Petar J. Grbović**, Philippe Delarue and Philippe Le Moigne, "A Three-Terminal Ultra-Capacitor Based Energy Storage and PFC Device for Regenerative Controlled Electric Drives," *IEEE Trans. Industrial Electronics*, Vol. 59, No. 1 pp. 301-316, January 2012.
- [J 9] **Petar J. Grbović**, Philippe Delarue and Philippe Le Moigne, "A novel three-phase diode boost rectifier using hybrid half-DC-BUS-voltage rated boost converter," *IEEE Trans. Industrial Electronics*, Vol. 58, No. 4 pp. 1316-1329, April 2011.
- [J 10] **Petar J. Grbović**, Philippe Delarue and Philippe Le Moigne, "Modeling and control of the ultra-capacitor based regenerative controlled electric drive system," *IEEE Trans. Industrial Electronics* Vol. 58, No. 8, pp. 3471-3484, August 2011.
- [J 11] **Petar J. Grbović**, P. Delarue, P. Le Moigne and P. Bartholomeus, "The ultra-capacitor based controlled electric drives with braking and ride-through capability: Overview and analysis," *IEEE Trans. Industrial Electronics*, Vol. 58, No. 3, pp. 925-936, March 2011.
- [J 12] **Petar J. Grbović**, Philippe Delarue, Philippe Le Moigne and Patrick Bartholomeus, "A bi-directional three-level dc-dc converter for the ultra-capacitor applications," *IEEE Trans. Industrial Electronics* Vol 57. No.10, pp. 3415-3430, October 2010.
- [J 13] **Petar J. Grbović**, Francois Gruson, Nadir idir, and Philippe Le Moigne, "Turn-on Performance of Reverse Blocking IGBT (RB-IGBT) and Optimization Using Advanced Gate Driver," *IEEE Trans. Power Electronics*, Vol. No. pp. April 2010.
- [J 14] **Petar J. Grbović**, "High Voltage Auxiliary Power Supply Using Series-Connected MOSFETs and Floating Self-Driving Technique," *IEEE Trans. Industrial Electronics*, Vol. 56, No. 5, pp.1446-1455, May 2009.
- [J 15] **Petar J. Grbović**, "Input Serial Output Parallel (ISOP) Connected High Voltage Power Supplies Based on Simple Master/Slave Control technique", *IEEE Trans. Power Electronics*, Vol. 24, No. 2, pp. 316-328, February 2009.
- [J 16] **Petar J. Grbović**, "Loss-Free Balancing Circuit for Series Connection of Electrolytic Capacitors Using an Auxiliary Switch Mode Power supply," *IEEE Trans. Power Electronics*, Vol. 24, No. 1, pp. 221-231, January 2009.
- [J 17] **Petar J. Grbović**, "An IGBT Gate Driver for Feed-Forward Control of Turn-on Losses and Reverse Recovery Current," *IEEE Trans. Power Electronics*, Vol. 23, No. 2, pp. 643-652, March 2008.

Key Notes & Invited Papers: (8)

- [KN 1] **Petar J. Grbović**, "Future of Power Engineering: Does Power Electronics Shift the Limits?" Plenary Talk, 5th Conference on Electrical, Electronic and Computing Engineering, IcETRAN, Palić, Serbia, 11th-14th June, 2018.
- [KN 2] **Petar J. Grbović**, "Passive Devices in Power Electronics: Nice to Have or a Must?" Key note, PCIM 2018, Nuremberg, Germany, June 5th-7th, 2018.

- [KN 3] **Petar J. Grbović**, "Static Power Converters; Past, Present and Future" Invited Paper, 4th Conference on Electrical, Electronic and Computing Engineering, IcETRAN, Kladovo, Serbia, 5th-8th June, 2017.
- [KN 4] **Petar J. Grbović**, "Multi-Level Multi-Cell Power Converters: A Way to Go Beyond the limit of Si-," Key Note Speech, 11th International Symposium on Industrial Electronics, INDEL 2016, Banja Luka, November 3rd-5th 2016.
- [KN 5] **Petar J. Grbović**, "Power Devices: Yesterday, Today and Tomorrow: -Issues, Trends and Solutions-," Invited talk, China Power Supply Society, Electronic Components and Devices Conference CPSC ECDC 2016, Xi'an, China October 14th- 15th, 2016.
- [KN 6] **Petar J. Grbović**, "Power Conversion Yesterday, Today and Tomorrow: -Issues, Trends and Solutions-," Key Note Speech, 18th International Symposium POWER ELECTRONICS Ee2015 Novi Sad, Republic of Serbia, October 28th- 30th, 2015.
- [KN 7] **Petar J. Grbović**, "Design of Advanced Power Converters," Chair and moderator of an Expert Group Rap Session, IEEE Energy Conversion Congress and Exposition, ECCE America 2013, Denver, Colorado, USA, September 15th-19th, 2013.
- [KN 8] **Petar J. Grbović**, "Power Electronics, from Yesterday to Tomorrow," Key Note Speech, International Conference on Electrical Science, ICES 2013, Tirumalaisamudram, India, August 9th-10th, 2013.

International Conferences: (37)

- [C 1] Marco Di Benedetto, Alessandro Lidozzi, Luca Solero, **Petar J. Grbović** and Fabio Crescimbinì, "Failure Mode Analysis of the 3-Phase 5-Level E-Type Converter", ECCE America 2019, Baltimore, USA, September 29th - October 3rd, 2019.
- [C 2] Marco Di Benedetto, Alessandro Lidozzi, Luca Solero, Petar J. Grbović and Fabio Crescimbinì, "Symmetrical Three-Phase 7-Level E-Type Inverter for PV Applications", 7th International Conference on CLEAN ELECTRICAL POWER ICCEP 2019, *Renewable Energy Resources Impact*, Otranto, Puglia- Italy 2-4 July 2019
- [C 3] **Petar J. Grbović**, "Partial-Power Rated Single-Phase Diode Boost Rectifier for Three-Phase Variable Speed Drives", ECCE Asia (ICPE 2019-ECCE Asia), Busan, Kore, May 27th -30th, 2019.
- [C 4] **Petar J. Grbović**, Marco Di Benedetto, Alessandro Lidozzi, Luca Solero and Fabio Crescimbinì, "5 Level E-Type Power Converter for Turbo Gen-Set Applications", ECCE Asia (ICPE 2019-ECCE Asia), Busan, Kore, May 27th -30th, 2019.
- [C 5] Marco Di Benedetto, Alessandro Lidozzi, Luca Solero, **Petar J. Grbović** and Fabio Crescimbinì, "Concurrent Control for Three-Phase Four-Wire Five Levels E-Type Inverter for Microgrids", ECCE America 2018, Portland, Oregon, USA, September 23rd-27th 2018.
- [C 6] Marco Di Benedetto, Alessandro Lidozzi, Luca Solero, Fabio Crescimbinì and **Petar J. Grbović**, "SPEEDAM 2018, Amalfi Coast, Italy, June 20th to 22nd 2018.
- [C 7] Miroslav Vasić, Diego Serrano, Pedro Alou, Jesus A. Oliver, **Petar J. Grbović** and Jose A. Cobos, "Comparative Analysis of Two Compact and Highly Efficient Resonant Switched Capacitor Converters", Applied Power electronics Conference, APEC 2018, San Antonio, Texas, USA, March 4th-8th, 2018.
- [C 8] Marco Di Benedetto, Alessandro Lidozzi, Luca Solero, Fabio Crescimbinì and **Petar J. Grbović**, "Performance assessment of the 5-level 3-phase back to back E-type converter", ECCE America 2017, Cincinnati, USA, .

- [C 9] Marco Di Benedetto, Alessandro Lidozzi, Luca Solero, Fabio Crescimbin and **Petar J. Grbović**, "Analysis and design of LC filters for the 5-level 3-phase Back to Back E-Type Converter", ECCE America 2017, Cincinnati, USA, .
- [C 10] Marco Di Benedetto, **Petar J. Grbović**, Alessandro Lidozzi, Luca Solero and Fabio Crescimbin, "Five-Level Back to Back E-Type Converter; A New Solution for Extreme Efficiency and Power Density," 13th Conference on PhD Research in microelectronics and Electronics, June 12th-15th, 2017, Giardini Naxos, Taormina, Italy.
- [C 11] **Petar J. Grbović**, Mirolsav Vasić, Jose A. Cobos, Jesus Olivier and Pedro Alou, "Experimental Evaluation of Capacitors for High Power Resonant Converters," PCIM 2017, Nuremberg, Germany, 16th-18th May, 2017.
- [C 12] Marco Di Benedetto, Alessandro Lidozzi, Luca Solero, Fabio Crescimbin and **Petar J. Grbović**, "Five-Level Back to Back E-Type Converter for High Speed Gen-Set Applications," IECON 2016.
- [C 13] Marco Di Benedetto, Alessandro Lidozzi, Luca Solero, Fabio Crescimbin and **Petar J. Grbović**, "Small-Signal Model for the ISOP DC-DC Converters in the 5-Level T-Rectifier," ECCE America 2016, Milwaukee, USA, September 18th-22nd, 2016.
- [C 14] Alessandro Lidozzi, Marco Di Benedetto, Luca Solero, Fabio Crescimbin and **Petar J. Grbović**, "Fault Tolerance Analysis for the 5-Level Unidirectional T-Rectifier," ECCE America 2016, Milwaukee, USA, September 18th-22nd, 2016.
- [C 15] Alessandro Lidozzi, **Petar J. Grbović**, Luca Solero, Marco Di Benedetto and Stefano Bifaretti, "ISOP DC-DC Converters Equipped 5-Level Unidirectional T-Rectifier for Aerospace Applications" IEEE Energy Conversion Congress and Exposition, ECCE America 2015, Montreal, Canada, September 20th-24th, 2015.
- [C 16] Marco Di Benedetto, Alessandro Lidozzi, **Petar J. Grbović**, Luca Solero and Fabio Crescimbin, "Low Frequency State-Space Model for the Five-Level Unidirectional T-Rectifier" IEEE Energy Conversion Congress and Exposition, ECCE America 2015, Montreal, Canada, September 20th-24th, 2015.
- [C 17] **Petar J. Grbović**, Alessandro Lidozzi, Luca Solero and Fabio Crescimbin, "Performance Evaluation for the Five-Level Unidirectional T-Rectifier in High-Speed Electric Generating Units" IEEE Energy Conversion Congress and Exposition, ECCE America 2015, Montreal, Canada, September 20th-24th, 2015.
- [C 18] Wilmar Martinez, Masayoshi Yamamoto and **Petar J. Grbović**, "Efficiency Optimization of a Single-Phase Boost DC-DC Converter for Electric Vehicle Applications", The 40th Annual Conference of the IEEE Industrial Electronics Society, IECON 2014, October 29th - November 1st, 2014, Texas, USA.
- [C 19] **Petar J. Grbović**, Fabio Crescimbin, Alessandro Lidozzi and Luca Solero, "Multi-level Converters for Low Voltage High Current Applications: -Issues, Challenges and Limitations-," 16th International Power Electronics and Motion Control Conference and Exposition, PEMC 2014, Antalya, Turkey, September 21st-24th, 2014.
- [C 20] **Petar J. Grbović**, Fabio Crescimbin, Alessandro Lidozzi and Luca Solero, "5-Level Unidirectional T-Rectifier for High Speed Gen-Set Applications," IEEE Energy Conversion Congress and Exposition, ECCE America 2014, Pittsburg, USA, September 14th-18th, 2014.
- [C 21] **Petar J. Grbović**, Fabio Crescimbin, Alessandro Lidozzi and Luca Solero, "Multi-level/Multi-cell Converters for Low Voltage/High Current Applications -Issues, Challenges and Limitations-", ECPE Workshop: Advanced Multilevel Power Converters, July 1st-2nd 2014, Toulouse, France.

- [C 22] **Petar J. Grbović**, “A Novel Current Sharing Control for Modular Parallel Connected Power Converters,” 15th IEEE Workshop on Control and Modeling for Power Electronics, June 22nd – 25th 2014, Santander, Spain.
- [C 23] **Petar J. Grbović**, “Modeling and Control of Ultra-Capacitor Based Energy Storage and Power Conversion Systems,” 15th IEEE Workshop on Control and Modeling for Power Electronics, June 22nd – 25th 2014, Santander, Spain.
- [C 24] **Petar J. Grbović**, “Closed Form Analysis of N-Cell Interleaved Two-Level DC-DC Converters: The DC Bus Capacitor Current Stress Analysis,” ECCE Asia 2013, Down Under, IEEE Energy Conversion Congress and Exposition, Melbourne, Australia, June 3rd –6th 2013.
- [C 25] **Petar J. Grbović**, “Three-level or Two-Level Two-cell Interleaved DC-AC Converter: What is a Right Choice?” PCIM 2013, Nuremberg, Germany, May 14th-16th 2013.
- [C 26] **Petar J. Grbović**, “Novel Ground Fault Detection Circuit for Three Phase PWM Variable Speed Drives,” PCIM 2013, Nuremberg, Germany, May 14th-16th 2013.
- [C 27] Veljko Palija & **Petar J. Grbović**, “Active Gate Driver for New Generation of High Power IGBTs: Nice to have or a Must?” PCIM 2013, Nuremberg, Germany, May 14th-16th 2013.
- [C 28] **Petar J. Grbović**, “A Comparative Analysis of the Three-Level T-Type and Two-Level Two-Cell Coupled Interleaved Inverter”, IECON 2012, IEEE Industrial Electronics Conference, Montreal, Canada, October 26th 28th 2012.
- [C 29] **Petar J. Grbović**, Philippe Delarue and Philippe Le Moigne, “Boost Diode Rectifier for Three-Phase Variable Speed Drives Supplied from the Single-Phase Mains: Analysis and Design”, IECON 2012, IEEE Industrial Electronics Conference, Montreal, Canada, October 26th 28th 2012.
- [C 30] **Petar J. Grbović**, Philippe Delarue and Philippe Le Moigne, “Interface Converters for Ultra-capacitor Applications in Power Conversion Systems”, EPE & IEEE Energy Conversion Congress and Exposition, ECCE Europe 2012 (EPE PEMC), Novi Sad, Serbia, September 2nd –6th 2012.
- [C 31] **Petar J. Grbović**, Philippe Delarue and Philippe Le Moigne, “Selection and Design of Ultra-Capacitor Modules for Power Conversion Applications: From Theory to Practice,” IEEE Energy Conversion Congress and Exposition, ECCE Asia 2012 (IPEMC) 2012, Harbin, China, June 2nd-5th 2012.
- [C 32] **Petar J. Grbović** and Michel Arpilliere, “IGBT Cross Conduction Phenomenon - Origin and Simple Protection Gate Driving Technique,” in Proc. EPE’09.
- [C 33] **Petar J. Grbović**, “Feed Forward Control of Turn off Performances of an IGBT in Short Circuit Conditions”, in Proc. EPE’07.
- [C 34] **Petar J. Grbović**, “Auxiliary Power Supplies in Low Power Inverters for Three Phase Tesla Induction Motors”, in Proc. PCIM’06, Nurnberg 2006.
- [C 35] **Petar J. Grbović**, “The Gate Drive Requirements for New Generation of High Current Low Voltage IGBTs Employed in Motor Converters”, in Proc. PEDS’05, Kuala Lumpur 2005.
- [C 36] **Petar J. Grbović**, and Perry Field, “Analysis of a Possibility to use 1200V IGBT Devices in Snubber-less Medium Power Motor Converters Supplied from the 600V Mains”, in Proc. EPE’05, Dresden 2005.
- [C 37] **Petar J. Grbović** and Slobodan N. Vukosavić, “An Auxiliary Power Supply Based on the Phase Voltage Ripple Employed in a Micro Inverters for Feeding a Three Phase Tesla’s Induction Motor”, in Proc. EPE’05, Dresden 2005.

[C 38] **Petar J. Grbović** and Slobodan N. Vukosavić, "A Novel Step Down Auxiliary Power Supply Employed in a Micro Drive for Three Phase Tesla's Induction Motor", in Proc. PCIM'05, Nurnberg 2005.

[C 39] **Petar J. Grbović**, "Challenges in Using new Generations of High Current Low Voltage IGBTs", in Proc. of PCIM'05, Nurnberg 2005.

Academic and Teaching Activities

Undergraduate & Graduate Courses

- [L 1] Electric Drives & Power Electronics, 3rd semester, Curriculum Electrical Engineering
- [L 2] Power Semiconductors, 4th semester, Curriculum Electrical Engineering
- [L 3] Switch Mode Power Supplies, 5th semester, Curriculum Electrical Engineering
- [L 4] Power Engineering & Electric Drives, 3rd semester, Curriculum Mechatronics
- [L 5] Power Converters, 3rd semester, Curriculum Master Mechatronics
- [L 6] Power Electronics & Drives, 2nd semester, Curriculum Master Mechatronics
- [L 7] Electro-mechanical Actuators, 2nd semester, Curriculum Master Mechatronics

IEEE Seminars and Short Master/PhD Courses: (29)

- [L 1] "Partial Power Rated Converters- A way to go Beyond the Limits," Summer School on Power Electronics and Applications, ECPE & Università degli Studi Roma Tre, Department of Mechanical and Industrial Engineering, Rome, Italy, July 5th, 2019.
- [L 2] "Power Converters and Chargers for Energy Storage Applications," Summer School on Power Electronics and Applications, ECPE & Università degli Studi Roma Tre, Department of Mechanical and Industrial Engineering, Rome, Italy, July 4th, 2019.
- [L 3] "Grid Connected Power Converters: Analysis, Design and from Theory to Practice," Summer School on Power Electronics and Applications, ECPE & Università degli Studi Roma Tre, Department of Mechanical and Industrial Engineering, Rome, Italy, July 3rd, 2018.
- [L 4] "Power Converters for Energy Storage Devices & Applications," Summer School on Power Electronics and Applications, ECPE & Università degli Studi Roma Tre, Department of Mechanical and Industrial Engineering, Rome, Italy, July 4th, 2018.
- [L 5] "Multi-level & Multi-Cell Power converters; A way to go Beyond the Limit," IEEE PES, Serbia & Montenegro Section, Belgrade, October 31st, 2017.
- [L 6] "Fundamentals of Solid-State Power Converters," 16h Undergraduate Course, Harbin Institute of Technology, Harbin, China, July 24th-29th, 2017.
- [L 7] "WBG Devices: Driving and Protection from Theory to Practice," Summer School on Power Electronics and Applications, ECPE & Università degli Studi Roma Tre, Department of Mechanical and Industrial Engineering, Rome, Italy, July 7th, 2017.
- [L 8] "Multi-level & Multi-Cell Power converters; A way to go Beyond the Limit," Summer School on Power Electronics and Applications, ECPE & Università degli Studi Roma Tre, Department of Mechanical and Industrial Engineering, Rome, Italy, July 3rd, 2017.
- [L 9] "Advanced Power Semiconductors: Art of Control from Theory to Practice," Short Master/PhD Course, Dipartimento di Ingegneria Elettrica, Elettronica e Informatica, University of Catania, Italy, June 20th, 2017.

- [L 10] "Fundamentals of Power Semiconductor devices," Short Master/PhD Course, Università degli Studi Roma Tre, Department of Mechanical and Industrial Engineering, Italy, October 21st, 2016.
- [L 11] "Fundamentals of Solid State Power Conversion," Short Master/PhD Course, Università degli Studi Roma Tre, Department of Mechanical and Industrial Engineering, Italy, October 20th, 2016.
- [L 12] "Introduction of Electromagnetic Compatibility (EMC) in Power Electronics & Power Converters," Summer School on Power Electronics and Applications, ECPE & Università degli Studi Roma Tre, Department of Mechanical and Industrial Engineering, Rome, Italy, July 5th, 2016.
- [L 13] "Ultra-capacitors and Batteries in Power Conversion: Applications, Analysis, Modelling and Design," Summer School on Power Electronics and Applications, ECPE & Università degli Studi Roma Tre, Department of Mechanical and Industrial Engineering, Rome, Italy, July 7th, 2016.
- [L 14] "Fundamentals of EMC in Power Electronics," Short Master/PhD Course, Centro de Electrónica Industrial (CEI), Universidad Politécnica de Madrid (UPM), Spain, May 17th, 2016.
- [L 15] "Multi-level & Multi-Cell Power converters; A way to go Beyond the Limit of Si," Short Master/PhD Course, Centro de Electrónica Industrial (CEI), Universidad Politécnica de Madrid (UPM), Spain, May 18th, 2016.
- [L 16] "Summer School on Power Electronics and Applications", ECPE & Università degli Studi Roma Tre, Department of Mechanical and Industrial Engineering, Rome, Italy, June 30th to July 15th, 2015.
- [L 17] "Advanced Power Semiconductors: Applications, Control, Protection and Testing," Short Master/PhD Course, Power Electronics Laboratory École Polytechnique Fédérale de Lausanne EPFL, Switzerland, May 4th, 2015.
- [L 18] "Ultra-capacitors in Power Conversion: Applications, Analysis & Design from Theory to Practice," Short Master/PhD Course, Centro de Electrónica Industrial (CEI), Universidad Politécnica de Madrid (UPM), Spain, April 30th, 2015.
- [L 19] "Advanced Power Semiconductors: Applications, Control, Protection and Testing," Short Master/PhD Course, Centro de Electrónica Industrial (CEI), Universidad Politécnica de Madrid (UPM), Spain, April 27th to 29th, 2015.
- [L 20] "Power Electronics Today and Tomorrow: Challenges, Issues and Perspective," Lecture at Università degli Studi Roma Tre, Department of Mechanical and Industrial Engineering, Italy, June 9th, 2014.
- [L 21] "Ultra-capacitors in Power Conversion: Applications, Analysis & Design from Theory to Practice," Lecture at Università degli Studi Roma Tre, Department of Mechanical and Industrial Engineering, Italy, June 4th, 2014.
- [L 22] "Electromagnetic Compatibility (EMC) in Power Electronics & Power Converters," Lecture at Università degli Studi Roma Tre, Department of Mechanical and Industrial Engineering, Italy, June 3rd, 2014.
- [L 23] " Ultra-capacitors in Power Conversion: Applications, Analysis & design from Theory to Practice," Short Master/PhD Course at Department of Electrical and Electronics Engineering, University of Hong Kong, Hong Kong, December 13th, 2013.
- [L 24] "Advanced Power Semiconductors: Art of Control from Theory to Practice," Short Master/PhD Course, at Department of Electrical and Electronics Engineering, University of Hong Kong, Hong Kong, December 12th, 2013.

- [L 25] "Advanced Power Semiconductors: Art of Control from Theory to Practice," Lecture at Università degli Studi Roma Tre, Department of Mechanical and Industrial Engineering, Italy, May 22nd, 2013.
- [L 26] "Ultra-capacitors in Power Conversion: Applications, Analysis & design from Theory to Practice," Lecture at Università degli Studi Roma Tre, Department of Mechanical and Industrial Engineering, Italy, May 22nd, 2013.
- [L 27] "Variable Speed Drive Converters: Status, Challenges and Trends," Faculty of Technical Science, University of Novi Sad, Serbia, October 2007.

IEEE PELS Distinguished Lecturer Talks

[L 28]

Tutorials: (20)

- [T 1] **Petar J. Grbović** "Multi-Level & Multi-Cell Power Converters: A Way to go beyond the limits," Half day tutorial, the 4th IEEE International Future Energy Electronics Conference (IFEEC 2019 Singapore), Singapore, November 25th-28th 2019, Singapore.
- [T 2] **Petar J. Grbović** "Power Converters for Energy Storage Applications-Analysis and Design from Theory to Practice," Half day tutorial, the 10th International Conference on Power Electronics-ECCE Asia (ICPE 2019-ECCE Asia), Busan, Korea, May 27th -30th, 2019.
- [T 3] **Petar J. Grbović** "Power Converters for Energy Storage Applications-Analysis and Design from Theory to Practice," Half day tutorial, 2nd International Power Electronics and Applications Conference and Exposition, PEAC 2018, Shenzhen, China, November 4th-7th, 2018.
- [T 4] **Petar J. Grbović** "Power Converters for Energy Storage Applications-Analysis and Design from Theory to Practice," Half day tutorial, 12th International Symposium on Industrial Electronics, INDEL 2018, Banja Luka, Bosna & Hercegovina, November 1st-3rd 2018.
- [T 5] **Petar J. Grbović** "Power Converters for Energy Storage Applications-Analysis and Design from Theory to Practice," Half day tutorial, ECCE America 2018, IEEE Energy Conversion Congress and Exposition, Portland, Oregon, USA, September 23rd-27th 2018.
- [T 6] **Petar J. Grbović** "Static Power Converters: Past, Present and Future," Half day Tutorial, SPEEDAM 2018, Amalfi Coast, Italy, June 20th to 22nd 2018.
- [T 7] **Petar J. Grbović** "Power Converters for Energy Storage Applications-Analysis and Design from Theory to Practice," Half day Professional Education Seminar, APEC 2018, San Antonio, Texas, USA, March 4th to 8th 2018.
- [T 8] **Petar J. Grbović** "Power Converters for Energy Storage Applications-Analysis and Design from Theory to Practice," Half day tutorial, IESSES 2018, Hamilton, New Zealand, January 30th- February 1st 2018.
- [T 9] **Petar J. Grbović** "Power Converters for Energy Storage Applications," Half day tutorial, INTELEC 2017, Gold Coast, Australia, October 22nd-25th 2017.

- [T 10] **Petar J. Grbović** "Power Converters for Energy Storage Applications," Half day tutorial, The 19th International Symposium Power Electronics (Ee 2017), Novi Sad, Republic of Serbia, October 19th-21st, 2017.
- [T 11] **Petar J. Grbović** "Power Electronics Today and Tomorrow: Issues, Trends and Solutions," Half day tutorial, The 11th IEEE International Conference on Power Electronics and Drive Systems (PEDS 2015), Sydney, Australia, June 9th to 12th, 2015.
- [T 12] **Petar J. Grbović** "Power Electronics Today and Tomorrow: Issues, Trends and Solutions," Half day tutorial, The 24th IEEE International Symposium on Industrial Electronics (ISIE 2015), Rio De Janeiro, Brazil, June 3rd to 5th, 2015.
- [T 13] **Petar J. Grbović** & Thierry Menyard "Power Semiconductors and Converters: Future, Challenges and Solutions," Half day tutorial, International Power Electronics Application Conference and Exhibition, PEAC 2014, Shanghai, China, 5th-8th 2014.
- [T 14] **Petar J. Grbović** & Thierry Menyard "Power Semiconductors and Converters: Future, Challenges and Solutions," Half day tutorial, 16th International Power Electronics and Motion Control Conference and Exposition, PEMC 2014, Antalya, Turkey, September 21st-24th 2014.
- [T 15] **Petar J. Grbović**, "Advanced Power Semiconductors: Art of Control From Theory to Practice," Half day tutorial, ECCE America 2013, IEEE Energy Conversion Congress and Exposition, Denver, Colorado, USA, September 15th-19th 2013.
- [T 16] **Petar J. Grbović**, "Ultra-capacitors in Power Conversion: Applications, Analysis & design from Theory to Practice", Full day tutorial, ECCE Europe 2013, EPE & IEEE Energy Conversion Congress and Exposition, Lille, France, September 3rd -5th 2013.
- [T 17] **Petar J. Grbović** & Leo Lorenz, "Advanced Power Semiconductors: Art of Control From Theory to Practice", Half day tutorial, ECCE Asia 2013, Down Under, IEEE Energy Conversion Congress and Exposition, Melbourne, Australia, June 3rd- 6th 2013.
- [T 18] **Petar J. Grbović**, "Ultra-Capacitors as Energy Storage for Power Conversion Applications: From Theory to Practice", Half day tutorial, EnergyCon 2012, Florence, Italy, September 9th -12th 2012.
- [T 19] **Petar J. Grbović**, "Art of Control of Advanced Power Semiconductors: From Theory to Practice", Full day tutorial, IPERC (ECCE Asia) 2012, IEEE Energy Conversion Congress and Exposition, Harbin, China, 2nd-6th 2012.
- [T 20] **Petar J. Grbović**, "Ultra-capacitors in power conversion: Analysis, Modeling and Design in Theory and Practice", Half day tutorial, ECCE 2011, IEEE Energy Conversion Congress and Exposition, Phoenix, Arizona, September 17th -22nd 2011.

PhD Mentor (1+3)

[PhD 1] **Marco Di Benedetto**, "3-Phase 5-Level E-Type Converter Topologies for Industrial Power Supply Applications", Doctorate Dissertation, Mechanical and Industrial Engineering Ph.D. School, Roma TRE University, Rome, Italy. The dissertation defended on April 23rd 2018.

[PhD 2]

Patents and Patent Applications

Patent Applications: (9)

- [P 1] **Petar J. Grbović**, Roland Huempfer, Miroslav Vasić, Pedro Alou, Jesus A. Oliver, and Jose A. Cobos, “New Resonant Switching Capacitor Converter-2ⁿ”, 85820366PCT01.
- [P 2] **Petar J. Grbović**, Roland Huempfer, Miroslav Vasić, Pedro Alou, Jesus A. Oliver, and Jose A. Cobos, “New Hybrid Ultra-efficient Converter for PV Applications, 85822357PCT01.
- [P 3] **Petar J. Grbović** and Nael Alsheakh Ameen, “Current sensing and current reconstruction in interleaved converters using single ADC” European Patent Application PCT/EP2017/056946.
- [P 4] **Petar J. Grbović**, “Method and apparatus for boosting a DC voltage” European patent Application EP 2 863 529 A1.
- [P 5] **Petar J. Grbović**, “Method and apparatus for performing power conversion” World Wide Patent Application WO2013185847 A1.
- [P 6] Duro Basic and **Petar J. Grbović**, “Mid-point voltage control” United States Patent Application US 2013 0163292A1.
- [P 7] Robert Wagoner and **Petar J. Grbović** “Device and system for reducing overvoltage damage” US and WO Patent Application US 2013 0169068, WO/2013/102012A1.
- [P 8] **Petar J. Grbović**, “Convertisseur de puissance utilisant un redresseur à transistors normalement fermés” EP2267880 A1.
- [P 9] **Petar J. Grbović**, “Current-source power converter using normally-on field effect transistors” FR 2953662 A1.

Patents (17)

- [P 10] **Petar J. Grbović**, “Neutral point clamped power converter fault detection, identification and protection,” US 8 472 153 B1.
- [P 11] **Petar J. Grbović**, “Wind turbine having high voltage ride through (HVRT) mode” United States Patent US 8432055 B2.
- [P 12] **Petar J. Grbović** and Mathieu Giroux, “Neutral point clamped (NPC) power converter fault protection system” United States Patent US 8 625 316 B1.
- [P 13] **Petar J. Grbović**, “Current-source power converter using normally-on field effect transistors” US 8 730 699 B2, EP2330731 B1.
- [P 14] **Petar J. Grbović**, “Dispositif de commande d'un transistor de puissance”.FR 2947973 B1, EP 2276173 A1, “Device for controlling a power transistor,” US 8 427 226 B1.
- [P 15] **Petar J. Grbović**, “Convertisseur de puissance utilisant un redresseur à transistors normalement fermés” FR 2945900 B1.
- [P 16] **Petar J. Grbović**, “Power converter using a rectifier with normally on transistors,” US 8 295 067 B2.
- [P 17] **Petar J. Grbović**, “Onduler a base de transistors a effet de champ normalament fermes,” FR 2943474 B1.
- [P 18] Heirnich Jelinek and **Petar J. Grbović**, “An option for power plant applications using Ultra capacitors,” The patent is pending in the Austrian patent office.
- [P 19] **Petar J. Grbović**, Philippe Baudesson and Philippe Le Moigne, “Energy recovery device in a variable-frequency drive,”US 8 319 457 B2.

- [P 20] **Petar J. Grbović**, Philippe Baudesson and Philippe Le Moigne, “Speed regulator with super capacitor,” EP 2 131 483 B1.
- [P 21] **Petar J. Grbović**, Philippe Baudesson and Philippe Le Moigne, “Energy-recovery device in a variable speed drive,” US 8 368 330 B2, EP 2338225 B1.
- [P 22] **Petar J. Grbović**, “Method and system for managing temperature in speed controller”, US 8 379 424 B2, EP 1981160 A1.
- [P 23] **Petar J. Grbović**, “Switch-mode power supply system and speed variator comprising such a system,” US 7 596 004 B2, EP 1914871 B1.
- [P 24] **Petar J. Grbović**, “Power-factor correction device for variable speed drive,” US 7 420 351 B2, EP 1788697 B1.
- [P 25] **Petar J. Grbović**, “Device for powering a variable speed drive,” US 7 336 052 B2, EP 1746700 B1.
- [P 26] **Petar J. Grbović**, “Power transistor control device,” United States Patent, US 7 368 972 B2, EP 1630961B1.

LANGUAGES

Serbian-Native, English-Fluent, French-Reading and Speaking, Russian-Basic, Italian-Basic, German- Basic

PROFESSIONAL LICENCES & ASOCIATIONS

- *Abilitazione Scientifica Nazionale (ASN)*, Ministero dell'Istruzione, dell'Università e della Ricerca, Italy, Full Professor Licence
- *IEEE, Senior Member* (Power Electronics, Industrial Electronics & Industry Applications Society), No. 80318139
- *IEEE Industrial Power Conversion Committee (IPCC)*, Liaison Officer for Europe
- *IEEE Industrial Applications Transaction (IAS)*, Guest Editor
- *IEEE PELS Distinguished Lecturer* 2019/2021
- *PCIM Europe*, Advisory Board Member
- *IEEE Energy Conversion Congress & Exposition (ECCE America)*, Committee Member
- *European Commission/H2020/Clean Sky*, Expert (ID EX2017D297064)