

Annual Conference of the IEEE Industrial Electronics Society (IECON 2021)

Special Session on

“Power Electronics and Modulation Techniques for Insulation Stress Reduction in Electric Machines”

Organized by

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Call for Papers

Theme: significant research is being proposed to develop ever-more reliable electrical machines, converters and drives, especially in transportation. This includes high-frequency and dv/dt effects introduced at component- and system-level by the new wide-bandgap devices, fault-tolerant systems, insulation aging mechanisms, lifetime degradation modelling, fault detection and advanced power electronics and modulation techniques. This special issue intends to collect papers dealing with power electronics and modulation techniques for insulation stress reduction in electric machines, as well as design, modelling and analysis of drives for improved reliability, at component- and at system-level. Authors from both academia and industry are invited to submit manuscripts. Original research and practical contributions as well as surveys and state-of-the-art tutorials are welcome.

Topics of interest include, but are not limited to:

- Modelling and analysis of high frequency effects in electric drives and their components, with special focus on the insulation system of electric machines
- Novel power electronics topologies which reduce voltage stress phenomena (partial discharges, bearing currents, etc.) of electric machines for improved reliability

- Analysis, modelling and mitigation strategies of partial discharge effects due to wide-bandgap devices in modern power electronics
- Analysis and design of the insulation system of electrical machines in conjunction with the power electronics converter
- Design, modelling and analysis methodologies for increased fault-tolerance and reliability of power converters and machines
- Modelling, detection and measurement of partial discharges and their effects in electric machines
- Physics of failure, characterization, aging and diagnostics of winding insulation materials and systems
- Lifetime prediction methods of electric drives, at component- and at system-level

IES Technical Committee Sponsoring the Special Session:

This special session is sponsored by the IES Electrical Machines Technical Committee

Brief Biography of the SS Organizers

STEFANO NUZZO (S'17-M'18) received the B.Sc. and M.Sc. degrees in Electrical Engineering from the University of Pisa, Pisa, Italy, in 2011 and 2014, respectively. He received his Ph.D. degree in Electrical Engineering in 2018 from the University of Nottingham, Nottingham, U.K, where he worked also as a Research Fellow within the Power Electronics, Machines and Control (PEMC) Group. From January 2019 to September 2020 he was a Research Fellow at the Department of Engineering "Enzo Ferrari" at University of Modena and Reggio, Modena, Italy, where he was then promoted as a Lecturer in October 2020. His research interests are the analysis, modelling and optimizations of electrical machines intended for industrial power generation, automotive and aerospace applications. He is also involved in a number of European-funded projects related to the more electric aircraft initiative. In particular, he is currently interested in the analysis and modelling of high-frequency effects on the insulation reliability of electrical machines, especially when these are fed by wideband gap – based power converters.

Dr. Nuzzo is a Member of the IEEE Industrial Electronics Society (IES) and the IEEE Industry Applications Society (IAS). He constantly serves the scientific community as a reviewer for several journals and conferences. In April 2021, he was the Track Chair of "Electrical Machine Design and Modelling" track at the 5th IEEE Workshop on Electrical Machines Design, Control and Diagnosis – WEMDCD.

GIAMPAOLO BUTICCHI (S'10-M'13-SM'17) received the Master degree in Electronic Engineering in 2009 and the Ph.D degree in Information Technologies in 2013 from the University of Parma, Italy.

In 2012 he was visiting researcher at The University of Nottingham, UK. Between 2014 and 2017, he was a post-doctoral researcher, and Guest Professor at the University of Kiel, Germany. During his stay in Germany, he was awarded with the Von Humboldt Post-Doctoral Fellowship to carry out research related to fault tolerant topologies of smart transformers. In 2017 he was appointed as Associate Professor in Electrical Engineering at The University of Nottingham Ningbo China and as Head of Power Electronics of the Nottingham Electrification Center. He was promoted to Professor in 2020.

His research focuses on power electronics for renewable energy systems, smart transformer fed micro-grids and dc grids for the More Electric Aircraft. Dr. Buticchi is one of the advocates for DC distribution systems and multi-port power electronics onboard the future aircraft. He is author/co-author of more than 230 scientific papers, an Associate Editor of the IEEE Transactions on Industrial Electronics, the IEEE Transactions on Transportation Electrification and the IEEE Open Journal of the Industrial Electronics Society. He is currently the Chair of the IEEE-IES Technical Committee on Renewable Energy Systems and the IES Energy Cluster Delegate."

ABRAHAM MARQUEZ ALCAIDE (S'14, M'16) was born in Huelva, Spain, in 1985. He received his B.S. and M.S. degrees in telecommunications engineering in 2014 and 2016 from the Universidad de Sevilla (US), Spain, where he is currently working toward the PhD degree in electronic engineering. His main research interest are modulation techniques, multilevel converters, power conversion for renewable energy sources and modelbased predictive control of power converters and drives. Mr. Marquez was recipient as coauthor of the 2015 Best Paper Award of the IEEE Industrial Electronics Magazine



**Good quality papers may be considered for publication in the IEEE
Trans. on Industrial Electronics, subject to further rounds of review.**