



DEPARTMENT OF ENERGY TECHNOLOGY
AALBORG UNIVERSITY

Guest lecture:

Single-Stage Boost Inverter for DDWTs

by

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Research Faculty Scholar, Kansas State University, USA**

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Aalborg University, Department of Energy Technology, Pon 101, room 23



Abstract:

In this seminar, Dr. Mirafzal will introduce his new power electronics group at Kansas State University, and an NSF I/UCRC center called Center for On-the-Move Energy technologies (COMET). In this seminar, he will talk about two different topics. First, he will present a new topology for direct-drive wind turbines with a low-voltage generator and zero dc-link impedance design. In the developed topology, the grid-side converter is replaced by a boost current source inverter, therefore removing the need for the dc-bus electrolytic capacitors which results in increasing the system lifetime. The developed topology utilizes the internal inductance of the generator in order to eliminate the inherently required dc-link inductor in the CSI topology. In the second part, he will present an atypical PWM technique for microgrid-interactive cascaded H-bridge multilevel converters operating under balanced and unbalanced conditions. As microgrids become more ubiquitous, demands upon microgrid connected converters continue to increase. When operating as part of a microgrid, particularly under islanded conditions, three-phase inverters may be expected to provide auxiliary services, such as negative-sequence current compensation, during both healthy and faulty converter operation. Unbalanced, non-sinusoidal PWM references may be generated when providing these services, and these references cannot exceed dc-bus voltage defined limits without causing overmodulation. The maximum positive-sequence voltage producible by microgrid-interactive inverters may, therefore, be diminished unless reference waveforms are adjusted.

About the lecturer:

Dr. Behrooz Mirafzal received his doctorate from Marquette University, Milwaukee, Wisconsin, in 2005. From 2005-08, he was with Rockwell Automation/Allen-Bradley, Mequon, Wisconsin, first as a senior development engineer and then promoted to a project engineer, where he was involved in research and development related to magnetic design and high-frequency reflected wave phenomena in motor-drive systems. From 2008-11, he was an assistant professor at Florida International University, Miami, Florida. In 2011, he joined Kansas State University and established the power electronics research laboratory. In 2015, he was promoted to an associate professor in the department of electrical and computer engineering at Kansas State University. Dr. Behrooz Mirafzal is the author or co-author of more than 60 IEEE transactions and IEEE conference papers, and holds three U.S. patents and one U.S. patent application. He is the recipient of a 2014 NSF CAREER Award, a 2012 NSF EPSCoR First award, the 2012 IEEE-PES Transactions Best Paper Award, the 2008 IEEE-IAS Transactions Second Best Paper Award, and an Innovation Award from Rockwell Automation in 2006. He has served as an IEEE senior member since 2007, an associate editor of IEEE Transactions on Industry Applications since 2011, the technical co-chair of the IEEE IEMDC International Conference in 2009 and the technical co-chair of the NAPS Conference in 2013.