



## SEMINAR

Room M309 ANIN

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### Recent Advances in Electric Machines and Power Electronics at EMPE Lab

by

Dr. Hamid A. Toliyat

Texas A&M University

**Abstract:** Power electronics in general has been defined as a multidisciplinary technology that encompasses power semiconductor devices, converter circuits, electrical machines, signal electronics, control theory, microcomputers and digital signal processors, and computer-aided design techniques. It is one of the broadest growth area in electrical engineering. Today, power electronic circuits are needed for every computer system, every digital product, industrial systems of all types, automobiles, home appliances, lamps and lightning equipment, motor controllers, and just about every possible application of electricity.

There was a time that the growth in this field was pushed by energy conservation goals. Today, there are many more benefits in terms of reliable, lightweight, cost effective power processors and motor drives. A host of new applications is made possible by improvements in semiconductor devices by better understanding of power electronics. Motors with integrated electronic controls will soon be the norm. It is now reasonable to envision a time when a majority of drives will have variable speed capability, permitting improved optimization of both the quality of the system's output, and its energy efficiency plus reduced cost. Portable telephones and communication devices demand tightly optimized power management. Advanced microprocessors need special techniques to supply their power. Utilities worry about the quality of their product, and about how to use electronics for more effective power delivery. The present phase of evolution is likely to continue for many more years; a new steady state is not yet in sight. This seminar presents a bird eye view on advancement in some of these key areas, such as electric machinery, motor drives, and fault diagnosis.

**Dr. Hamid A. Toliyat** is currently Raytheon endowed professor of electrical engineering. He received the prestigious **Nikola Tesla Field Award** for "outstanding contributions to the design, analysis and control of fault-tolerant multiphase electric machines" from IEEE in 2014, the Cyrill Veinott Award in Electromechanical Energy Conversion from the IEEE Power Engineering Society in 2004, Patent and Innovation Award from Texas A&M University System Office of Technology Commercialization's in 2016 and 2007, TEES Faculty Fellow Award in 2006, Distinguished Teaching Award in 2003, E.D. Brockett Professorship Award in 2002, Eugene Webb Faculty Fellow Award in 2000, and Texas A&M Select Young Investigator Award in 1999. He has also received the Space Act Award from NASA in 1999, and the Schlumberger Foundation Technical Awards in 2001 and 2000.

Prof. Toliyat work is highly cited by his colleagues more than 16,000 times. Dr. Toliyat was an Editor of IEEE Transactions on Energy Conversion. He was Chair of the IEEE-IAS Industrial Power Conversion Systems Department of IEEE-IAS, and is a member of Sigma Xi. He is a fellow of the IEEE, the recipient of the 2008 Industrial Electronics Society Electric Machines Committee Second Best Paper Award as well as the recipient of the IEEE Power Engineering Society Prize Paper Awards in 1996 and 2006, and IEEE Industry Applications Society Transactions Third Prize Paper Award and Second Prize Paper Award in 2006 and 2016, respectively. His main research interests and experience include analysis and design of electrical machines, variable speed drives for traction and propulsion applications, fault diagnosis of electric machinery, and sensorless variable speed drives. Prof. Toliyat has supervised more than 85 graduate students, post docs, and research engineers. He has published over 450 technical papers, presented more than 90 invited lectures all over the world, and has 20 issued and pending US patents. He is the author of DSP-Based Electromechanical Motion Control, CRC Press, 2003, the co-editor of Handbook of Electric Motors - 2<sup>nd</sup> Edition, Marcel Dekker, 2004, and the co-author of Electric Machines – Modeling, Condition Monitoring, and Fault Diagnosis, CRC Press, Florida, 2013. Dr. Toliyat is a Professional Engineer in the State of Texas.