



Prof. Hamid Toliyat received the B.S, degree from Sharif University of Technology, Tehran, Iran in 1982, the M.S. degree from West Virginia University, Morgantown, WV in 1986, and the Ph.D. degree from University of Wisconsin-Madison, Madison, WI in 1991, all in electrical engineering. Following receipt of the Ph.D. degree, he joined the faculty of Ferdowsi University of Mashhad, Mashhad, Iran as an Assistant Professor of Electrical Engineering. In March 1994 he joined the Department of Electrical and Computer Engineering, Texas A&M University where he is currently Raytheon endowed professor of electrical engineering.

Dr. Toliyat will be receiving the 2014 IEEE Nikola Tesla Field Award for contributions to the design, analysis and control of fault-tolerant multiphase electric machines. He received the prestigious 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 2007, Texas A&M 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.

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 the 2006 IEEE Industry Applications Society Transactions Third Prize Paper Award. 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 80 graduate students, post docs, and research engineers. He has published over 400 technical papers, presented more than 80 invited lectures all over the world, and has 13 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 - 2nd Edition, Marcel Dekker, 2004, and the co-author of Electric Machines – Modeling, Condition Monitoring, and Fault Diagnosis, CRC Press, Florida, 2013.

He was the General Chair of the 2005 IEEE International Electric Machines and Drives Conference in San Antonio, Texas. Dr. Toliyat is a Professional Engineer in the State of Texas.

Contact Information:

Hamid A. Toliyat, Ph.D., P.E., Fellow of IEEE
Raytheon Co. Endowed Professor
Group Leader, Electric Power and Power Electronics Group
<http://ece.tamu.edu/programs/EPL/power.html>
Director, Advanced Electric Machines & Power Electronics (EMPE) Lab.
<http://www.ece.tamu.edu/~empelab/>
Department of Electrical & Computer Engineering,
Texas A&M University
College Station, TX 77843-3128
Phone: (979) 862-3034

Lecture Topics:

AC-Link Universal Power Converters for Renewable Energy and Transportation

Abstract

Universal power converter is referred to a class of power converters in which the input and output each can be either dc, ac, single phase or multi-phase. In this seminar an ac-link universal power converter will be introduced. Substituting the dc link with high frequency ac-link reduces the size and weight of the converter and increases the reliability to a great extent. By adding a small capacitor to the link the switches can be turned on at zero voltage and have a soft turn-off. In this case, the link frequency and consequently the switching frequency can be as high as allowed by the switches as the switching losses are negligible. Although this converter is still a new technology, it has a very promising future. This seminar studies the ac-link universal power converters in-depth therefore it will be more useful for intermediate or advanced audience. A brief overview on existing technologies and main problems associated with them will be discussed when addressing different applications of this converter.

Design and Performance Improvement of Electromechanical Devices

Abstract

Over the years, as the price of fuel has continued to rise, the popularity of electric and hybrid electric vehicles has increased. The majority of developments have been focused on propulsion systems. Losses from vehicle auxiliary functions, such as pumps, compressors, etc., are another source of inefficiencies that have remained unchallenged until now. This talk will cover developments associated with the electrification of vehicles, naval ships, and etc.

As an example, a new class of efficient and low cost permanent magnet machines called permanent magnet assisted-synchronous reluctance machines (PMA-SynRM) for compressor applications will be presented. In order to have an efficient system, performing three steps in design of the overall drive is not avoidable. These steps are: (1) design optimization of the motor, (2) identification of the motor parameters, and (3) implementation of an advanced control system to ensure optimum operation.

In this talk, design optimization of the PMA-SynRM will be covered. Various key points for rotor design are introduced and their effects are studied. Finite element approach will be utilized to show the effects of these parameters on the developed average electromagnetic torque. Therefore, one of the features considered in the design of this motor is the magnetization of the permanent magnets mounted in the rotor core using the stator windings. This feature will cause further reduction in the cost and ease in manufacturing. Effectiveness of the design procedure is validated by presenting simulation and experimental results of a 1.5 kW prototype.