

THE DEPARTMENT OF ELECTRICAL & COMPUTER ENGINEERING SPEAKER SERIES

PRESENTS

Optimal design, control and condition monitoring of IPMSM and induction motor drives



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Monday, **15 Apr. 2019**, 9.55 AM

Room **D3-W122**, Engineering Building 2

LECTURE ABSTRACT

This talk focuses on optimal magnetic design and control of interior permanent magnet synchronous machines (IPMSM) to improve their torque density, reduce torque pulsation, and to mitigate their acoustic noise and vibration. Novel magnetic configurations (double stator IPMSM) and a new sculpturing technique for the rotor of IPMSM will be introduced first. In addition, a maximum torque per ampere control strategy for these motor drives will be introduced. This presentation will also summarize the work on modeling and prediction of radial stator vibration of the IPMSM drives. Experimental and numerical results will be given to support the proposed technique.

Online health monitoring of induction motor drives will form the second segment of this talk. Using a novel self-powered sensor, vibration and surface temperature of induction motor drives will be monitored. This information will be pre-processed and key information will be broadcast to clouds where machine learning algorithms are used to detect abnormal conditions such as inter-turn short circuit and bearing faults. Application of the above technology in commercial HVAC systems will be demonstrated.

SPEAKER BIOSKETCH

Dr. Babak Fahimi earned his PhD in Electrical Engineering from Texas A&M University in 1999. Dr. Fahimi has been the recipient of DAAD scholarship (1993-1995), IEEE R.M. Bass Power Electronics Young Investigator Award (2003), SAE Ralph Teetor Educational award (2008), Fulbright scholarship in 2010, and IEEE Cyril Veinott electromechanical energy conversion award in 2015. Dr. Fahimi has co-authored 340 scientific articles, 15 book chapters, and several technical reports in the general area of adjustable speed motor drives and power electronics. He holds 19 US patents and has 6 more pending. Dr. Fahimi has supervised 30 PhD (Five tenured/tenure track professors) and 22 M.S. students. He is a Fellow of IEEE for his contributions to modeling and analysis of adjustable speed ac motor drives. Dr. Fahimi is a distinguished Chair of Engineering and the founding director of the renewable energy and vehicular technology at the University of Texas at Dallas.