Keynote Speaker's Information

Name	Ronghai Qu	**Country**	China
Position	Professor		
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Biography	Ronghai Qu, Fellow IEEE, received his B.E. and M.S. degrees from Tsinghua University, Beijing, China, in 1993 and 1996, respectively, and the Ph.D. degree in electrical engineering from University of Wisconsin-Madison in 2002. He had been with the General Electric (GE) Global Research Center, Niskayuna, NY as a Senior Electrical Engineer with the Electrical Machines and Drives Laboratory from 2003 to 2010. He was the recipient of more than 11 GE GRC awards including EPST Technical Achievement Award, Outstanding Teamwork and Management Award. In 2010 he joined Huazhong University of Science & Technology, Wuhan, China as a titled professor. He is currently the member of academic degrees committee, director of State and Province Joint Engineering Research Center of Novel Electrical Machines, director of Center for Advanced Electrical Machines and Drives (CAEMD), and deputy director of State Key Laboratory of Advanced Electromagnetic Engineering and Technology. From 2012 to 2016, he served as deputy dean of school of Electrical & Electronic Engineering. He is currently a member of ICEM NPO AdCom and the chair of IEEE Industry Application Society (IAS) Wuhan Chapter. His research interests include Design and Drive of Electrical Machines. He has published over 400 technical papers including 12 IEEE award papers and holds over 170 patents. Dr. Qu is the IAS Distinguished Lecturer for 2019-2021, a winner of IAS Outstanding Member Awards in 2019 and 7th Nagamori Awards in 2021. Dr. Qu is also winner of China Electrotechnical Society's Science and Technology Invention Award (1st Prize), Gold Award of International Exhibition of Inventions of Geneva, 2019, and Hubei Provincial Science and Technology Progress Award(First Prize).		
Lecture Title	Flux Modulation Machines – Principle, Topologies, and Application		

Lecture Summary	Electrical Machine, as an energy conversion device between electric and mechanical energy, plays an important role in industrial development. Nowadays, the rapid development of emerging industries, such as wind power generation, electrical ship propulsion, new energy vehicles and industrial robotics, has put ever-increasing demand on torque capability of electrical machines, specially permanent magnet (PM) machines. For the regular machines, the pole-pairs of machine stators and rotors are identical, where the torque is produced by the single working harmonic from the rotor and stator magnetic fields. During the last hundred years, numerous studies have been done to enhance the working harmonics and weaken the non-working harmonics, so as to acquire the sinusoidal air-gap magnetic fields and improve the quality of torque. The presentation will provide a view on electrical machines from the third eye –Flux Modulation point of view. As a new type of machine, the flux modulation PM machines, have drawn more and more attention due to their great torque density capability. Compared with regular PM machines, the pole-pairs of armature windings and rotor PMs in flux modulation machines are different, where the torque is generated by multiple working harmonics of PM magnetic fields and armature magnetic fields. Under the same electric and magnetic loadings, the flux modulation machines can acquire nearly double torque density of regular PM machines. This presentation will introduce flux modulation fundamental operation principles, machine main features, and topologies including multiple magnetomotive force harmonic machines, multiple permeance harmonics machines and double-modulation machines. Applications, challenges, and research opportunities will be discussed as well. *※ You can update your presentation title and summary at any time.*
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