Professor Zi Qiang (Z.Q.) Zhu

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Professor Z.Q. Zhu is currently Chair Professor of Electrical Machines and Control Systems at The Hong Kong Polytechnic University, after 38 years at the University of Sheffield, UK, where from 2008 to 2025, he was Head of Electrical Machines and Drives Research Group, a world leading research group in its field, particularly well-known for its research and development on permanent magnet machines and systems.

His research interests and experience include the fundamental and applied research on novel permanent magnet machines and control systems for various applications, ranging from electrified transportations (electric vehicles, fast trains, and electric aircrafts) through wind power generation to domestic appliances, industrial drives and automation components and systems etc. They have been commercially exploited extensively by many global industries. He has authored/co-authored >200 invention patents, 7 monographic books and 5 edited books, >1500 journal/conference papers including >600 IEEE/IET journal papers, which have been extensively cited, with Google citations >60,000/h-index=124. He has supervised 45 postdoctoral research associates and 111 graduated PhD students.

Professor Zi Qiang Zhu is Fellow of Royal Academy of Engineering (UK), Fellow of National Academy of Inventors (USA), Fellow of IEEE (USA), Fellow of IET (UK), and Fellow of Chinese Society of Electrical Engineering and China Electrotechnical Society (China). He is/was the Editor-in-Chief of IET Electric Power Applications (EPA), Deputy Editor-in-Chief of CES Transactions on Electrical Machines and Systems, and Editor/Associate Editor of IEEE Energy Conversion and IEEE Industry Applications, etc.
He is the recipient of the 2024 Global Energy Prize, the 2021 IEEE Nikola Tesla Award, the 2019 IEEE Industry Applications Society Outstanding Achievement Award, and 42 Best Paper Awards including 8 IEEE Transactions/IET Proceedings Best Journal Paper Awards.

Prof. Zhu is General Chair and Chair/Co-chair of Technical Programme/Organizing Committee of 28 leading international conferences including IEEE-ECCE2011, VPPC2016, ICEMS2008/11/14/17/19. He has delivered 58 Keynote Speeches at leading international conferences including IEMDC2011 and ICEMS2008/11/14/17/23.

He is/was Panel member of Royal Academy of Engineering, Panel 7 - Electrical & Electronic (2018-), EPSRC Engineering Panel member (2013-2019); NSFC Overseas Panel member (2001-2006); IEEE Medal in Power Engineering Committee member (2018-2021), IEEE IAS Outstanding Achievement Award Committee Member (2020-2025), IEEE IAS Outstanding Educator/Mentor Award Committee Member, 2026, IEEE IAS Distinguished Lecturer, 2026-2027.

List of the lecture topics with the titles and short abstracts (max. 600 characters each)

1. Field Modulated and Magnetically Geared Electrical Machines

Electrical machines and control systems are a key technology for electrified transportation including electric vehicles, trains, ships and aircrafts etc. This lecture focuses on the origin, development, and relationship of different types of electrical machine technologies and topologies with field modulation and magnetic gearing effects, including switched reluctance machines, stator-PM machines, vernier PM machines, fractional slot PM machines, dual-PM machines, dual-stator machines, dual rotor machines, wound field machines, hybrid excited machines, and brushless doubly-fed machines, as well as other magnetically geared machines.

2. Developments of Rare-Earth Magnetless Machines

Permanent magnet machines have been widely employed for many applications due to high efficiency and high torque density. However, relatively high cost and potential supply issue of rare-earth magnets are major concerns globally. Rare-earth magnetless machines are being seriously considered and investigated. This lecture will focus on novel rotor and stator electrically excited synchronous machines developed from switched reluctance machines, with focus on the evolution and development in both machines and inverters, together with electromagnetic performance and acoustic noise and vibration behaviour.

3. Evolution of Novel High Torque Density PM Machine Topologies

Permanent magnet (PM) machines have been widely employed for many applications due to high efficiency and high torque density. This presentation will start with stator/rotor topologies and slot/pole number combinations of permanent magnet machines to illustrate how novel PM machine topologies had evolved, including fault-tolerant stator winding configurations and modular stator topologies, various rotor PM structures for different applications, fractional slot and Vernier PM machines, as well as field modulated and magnetically geared PM machines.

4. Novel Multiphase PM Machines and Control Techniques for Electrified Transportations

Multiphase electrical machines have many advantages, such as high fault tolerance, good power sharing, potential modular inverters, improved torque density, reduced torque ripple, more control freedom, reduced dc link pulsating and dc link capacitor requirement etc. Consequently, they are extensively investigated and widely used for electric vehicles, electric ship propulsion, more electric aircrafts, and electric train propulsion, as well as wind turbine generators, etc. This lecture overviews various novel multiphase permanent magnet machine topologies and control strategies, and present recent developments in new dual-three-phase permanent magnet machines and control techniques.