

Fundamentals of Battery Electric & Hybrid Vehicle Machines and Drives

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Abstract:

With ever increasing concern on our environment, battery electric vehicles (BEVs) and hybrid electric vehicles (HEVs) are becoming popular. While electric vehicles (EVs) involve multidisciplinary technologies, one of their key technologies is machines and drives. In this lecture, an overview of EV machines and drives will be given. Firstly, the definition of various types of EVs as well as their key merits and shortcomings will be presented. Then, the system configurations of BEVs and HEVs will be introduced. Secondly, the existing motor drives for BEVs, including the DC motor, induction motor, permanent-magnet (PM) synchronous motor and PM brushless DC motor, will be discussed. Then, some emerging motor drives such as the stator-PM motor, vernier PM motor and magnetless motor will be introduced. Thirdly, the main machine system for HEVs, namely the planetary-gear electronic continuously variable transmission (ECVT), will be described. Meanwhile, some emerging machine systems such as the double-rotor ECVT and magnetic-gear ECVT will be introduced. Finally, the development trend of EV machines and drives will be revealed.

About the distinguished lecturer:



K. T. Chau received his B.Sc. (Eng.) degree with First Class Honors, M.Phil. degree, and Ph.D. degree all in Electrical and Electronic Engineering from The University of Hong Kong. He joined the alma mater in 1995, and has served as Director of International Research Centre for Electric Vehicles for over ten years. Currently, he is Professor in the Department of Electrical and Electronic Engineering, and Director of B.Eng. degree in Electrical Engineering. His teaching and research interests are electric and hybrid vehicles, machines and drives as well as power electronics. In these areas, he has published 7 books, 9 book chapters, over 250 refereed journal papers, and many industrial reports.

Dr. Chau is Fellow of the IEEE for Contributions to Energy Systems for Electric and Hybrid Vehicles. He is a Chartered Engineer, and Fellow of the IET. He has served as editors and editorial board members of various international journals as well as chairs and organizing committee members of many international conferences, especially in the area of Electric Vehicles. He is also an international consultant for electric vehicle technologies. Professor Chau has received many awards, including the Environmental Excellence in Transportation Award for Education, Training and Public Awareness, and the Award for Innovative Excellence in Teaching, Learning and Technology. He is currently the IEEE VTS Distinguished Lecturer.