Preface for Special Issue on Electric Drive System for Vehicles

Xiangyang Xu^{1,2} · Guangyu Tian³ · Hui Liu⁴

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What is the biggest challenge when vehicles move towards electrification? Electric drive system responds positively to this question, which plays a key role in terms of energy saving and carbon emission reduction. Besides, it is required to provide excellent driving performance, therefore becoming a hot topic in the automotive field. Hence *Automotive Innovation* proposed this special issue.

Electric drive system is necessary for both battery electric vehicles and hybrid electric vehicles. In comparison with a conventional vehicle powertrain, an electric drive system requires higher integration, higher speed, and higher power density. To meet these requirements, innovations regarding the design, control, and optimization of the electric drive system as well as its core components such as electric motor, transmission, and battery continuously emerge recently. Nine papers on these topics are collected in this special issue which reflects the latest scientific advancement and technological development of the electric drive system.

1 Highlights of Papers in the Special Issue

1. “Review and Development of Electric Motor Systems and Electric Powertrains for New Energy Vehicles” by William Cai et al. [Paper No. 1] gives a comprehensive review on the recent research and technical progress of electric motor systems and electric powertrains for new energy vehicles.

✉ Xiangyang Xu
xxy@buaa.edu.cn

¹ School of Transportation and Science Engineering, Beihang University, Beijing 102206, China

² Ningbo Institute of Technology, Beihang University, Ningbo 315832, China

³ School of Vehicle and Mobility, Tsinghua University, Beijing 100084, China

⁴ Department of Vehicle Engineering, Beijing Institute of Technology, Beijing 100081, China

2. “Study of Series–Parallel and Power-Split DHT for Hybrid Powertrains” by Ferit Küçükay et al. [Paper No. 2] conducts a comparison between series–parallel DHT and powersplit DHT with one mode or two modes regarding the structure, function, and performance.
3. “A Novel Electric Dual Motor Transmission for Heavy Commercial Vehicles” by Xiangyang Xu et al. [Paper No. 3] introduces a novel electric dual motor transmission (eDMT) with 9 operation modes for energy management strategy, mode power shift control strategy, and applications of heavy commercial vehicles.
4. “Model-Based Double Closed-Loop Coordinated Control Strategy for the Electro-Mechanical Transmission System of Heavy Power-Split HEVs” by Weida Wang et al. [Paper No. 4] proposes a double closed-loop electric power coordinated control strategy for heavy hybrid electric vehicles to improve the precision of system power distribution and the response speed of electrical power supply.
5. “Adaptive Fault-Tolerant Control During the Mode Switching for Electric Vehicle Dual-Mode Coupling Drive System” by Lipeng Zhang et al. [Paper No. 5] proposes a fault-tolerant control method to deal with the angular displacement sensor failure of the dual-mode coupling drive system.
6. “Objective Rating of the Launch Behavior of Conventional, Hybrid and Electric Vehicles” by Christian Oliver Dorsch et al. [Paper No. 6] introduces a rating system developed for the investigation of the launch behavior of conventional, hybrid, and electric vehicles.
7. “Automotive Traction Drive Speed Reducer Efficiency Testing” by James Durack et al. [Paper No. 7] introduces a particular form of high-fixed-ratio (15:1) traction drive speed reducer, and its test and simulation results show more potential to improve the WLTC efficiency for EV compared to the two-stage 15:1 toothed transmission.
8. “An Online Adaptive Internal Short Circuit Detection Method of Lithium-Ion Battery” by Zhongbao Wei et al. [Paper No. 8] proposes a model-based and self-diagnostic method for online internal short-circuit detection of

lithium-ion battery using the measured load current and terminal voltage.

9. “Joint Estimation of Inconsistency and State of Health for Series Battery Packs” by Xiaosong Hu et al. [Paper No. 9] presents a novel joint inconsistency and SOH estimation method for batteries of electric vehicles, utilizing parameters extracted from the fast-charging process.

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all the authors, reviewers, and editors. We would like to thank all authors, reviewers, and the staff from the editorial office of *Automotive Innovation* for their hard work and support. We are also indebted to the support of Beihang University, Tsinghua University, Beijing Institute of Technology, and Technische Universität Braunschweig. Heartly hopes this special issue can inspire scientific ideas and promote research in the fields of the electric drive system.

2 Guest Editors

Prof. Xiangyang Xu

Executive Deputy Director of National Engineering Research Center for Passenger Car Automatic Transmissions and Professor at Beihang University
Email: xxy@buaa.edu.cn

Prof. William Cai

Professor at Harbin University of Science and Technology
Email: William_cai@163.com

Prof. Guangyu Tian

Professor at School of Vehicle and Mobility, Tsinghua University
Email: tian_gy@tsinghua.edu.cn

Prof. Amir Khajepour

Director of Mechatronic Vehicle Systems Lab in the Department of Mechanical and Mechatronics Engineering, University of Waterloo
Email: a.khajepour@uwaterloo.ca

Prof. Hui Liu

Director of Vehicle Engineering Department at Beijing Institute of Technology
Email: lh@bit.edu.cn

Prof. Nong Zhang

Professor at School of Electrical, Mechanical and Mechatronic Systems, University of Technology Sydney
Email: nong.zhang@uts.edu.au

Prof. Ferit Küçükay

Director of Institute of Automotive Engineering (IAE) at Technische Universität Braunschweig
Email: f.kuecuekay@tu-bs.de

Prof. Peter Tenberge

Director of Institute for Industrial and Automotive Drivetrains at the Ruhr-University Bochum
Email: peter.tenberge@ruhr-uni-bochum.de