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## Preface

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**Biographical notes:** Hong Yang received his PhD in Mechanical Engineering (2002) and MS in Electrical Engineering from the University of Michigan, Ann Arbor. He also holds MS in Robotics and BS in Mechanical Engineering from Southeast University, Nanjing, China. He is currently the Manager of Battery Management System and Controls with the Electrified Powertrain at Chrysler LLC. Before joining Chrysler, he worked at General Motors as Project Leader for advanced hybrid electric system development. He is the member of ASME Vehicle Design Committee and Technical Council for Advanced Vehicle Technologies and Integration (VTI). He has been the conference organiser for IEEE VPPC and ITEC Conferences.

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Electrification of vehicle systems has received increasing attention from governments, industry, and public around the world due to the growing concerns on global warming, fossil fuel shortage, as well as passenger vehicle safety. With much smaller carbon footprints and significantly improved fuel economy, Electric Vehicles (EV), Hybrid Electric Vehicles (HEV), Plug-in Hybrid Electric Vehicles (PHEV), and Fuel Cell Vehicles (FCV) potentially define the landscape of future ground transportation system. Vehicle electrification demands a paradigm shift from conventional technologies that predominantly focus on internal combustion engine coupled with hydraulic or mechanical

ratio changing mechanisms. This revolutionary shift demands the development of advanced energy storage systems, electric motors, power electronics and electrified powertrain systems.

While vehicle electrification presents great opportunity in developing sustainable transportation options for the future, major technological and economic hurdles remain to be overcome in order to promote sustainable growth and market penetration of the hybrid electric, battery electric and fuel cell vehicles. The enabling technologies such as power management, design optimisation, advanced powertrain controls and integration, diagnostics and prognostics of vehicle electrical system play crucial roles to solve these hurdles.

This special issue of the *International Journal of Vehicle Design* therefore focuses on the state-of-the-art research and development efforts on these enabling technologies for sustainable ground vehicle electrification with low cost, high efficiency, low emission, satisfactory driving experience and promising passenger safety. The specific topics covered by this special issue expand over three major areas:

- Modelling, analysis, control and optimisation of EV/HEV/PHEV/FCV, including energy and power management control, multidisciplinary dynamic analysis, controls and integration of the electrified powertrain.
- Energy storage and motor/power electronics systems, including advanced battery management and charging systems, design, controls and diagnostics technologies of electric motor and power electronics.
- Electrified propulsion and advanced vehicular systems, including innovative hybrid powertrain architecture, alternative internal combustion engine technologies, electrified vehicle system design and optimisation.

It took hard work by a large team to make this special issue possible. We would like to thank all the contributing authors for their submissions. And we apologise for having to cut some high-quality manuscripts due to the volume limitation. We are also grateful that the reviewers devoted their precious time to make this special issue successful. We owe the IJVD editorial board and publishing team a big thank-you for their great support throughout the process. Last but not least, our special thanks go to Dr. Dongpu Cao and Dr. Kevin Deng, whose encouragements were crucial for us to initiate this issue.