Preface

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Biographical notes: David Gorsich is the Chief Scientist at the US Army Tank Automotive Research, Development and Engineering Centre (TARDEC). He was also selected as the Army's Chief Scientist for Ground Vehicle Systems in 2009. Prior to this he was TARDEC's Director of Strategic Plans and Programs and the Associate Director for Modelling and Simulation and was also responsible for their High Performance Computing Centre. He received his BS in Electrical Engineering from Lawrence Technological University, his MS in Applied Mathematics from George Washington University and his PhD in Applied Mathematics from the Massachusetts Institute of Technology in 2000. He has published and presented over 150 papers in the areas of simulation, reliability-based design methods, terrain modelling, spatial statistics and other approximation methods. He is an SAE Fellow and is on the SAE Board of Directors. He also serves on the Editorial Board of the *International Journal of Terramechanics* and the *Journal of Mechanical Design*.

Zoran Filipi has been the Professor and Timken Endowed Chair in Vehicle System Design at the Clemson University International Centre for Automotive Research (ICAR) since January 2012. He was with the University of Michigan between 1994 and 2011, where he rose to the rank of Research Professor and served as the director of the Centre for Engineering Excellence through Hybrid Technology and the deputy director of the Automotive Research Centre, a US Army Centre of Excellence for modelling and simulation of ground vehicles. He received his PhD in Mechanical Engineering from the University of Belgrade in 1992. His main research interests are advanced IC engine concepts, alternative fuels, alternative and hybrid powertrain systems and energy for transportation. He published over 150 papers in international journals and refereed conference proceedings and holds three patents. He is an SAE Fellow and the recipient of the SAE Forest R. McFarland Award (2009), the IMechE Donald Julius Groen Award (2010), IMechE Journal of Automobile Engineering Best Paper Award (2012) and the UofM Research Faculty Achievement Award (2010).

Heavy-duty military and commercial vehicle sectors are undergoing a period of rapid transformation. The impetus for innovation and development of advanced technologies is created with recognition of energy supply and climate change challenges and an ever-expanding list of vehicle attributes essential for accomplishing complex missions. The ability to shorten the vehicle product development cycle has been and will continue to be, an active area of research. Improving upon data management, the reuse of designs, integration of business processes, reducing testing costs and increasing the validity and usefulness of analytical tools are key areas of government, academic and industrial research.

Ground systems are complex with a wide range of technologies and subsystems that must be integrated and optimised to maximise the vehicle's mobility, safety, performance and reliability at reasonable cost. This is no easy task for an automotive research and development organisation. It requires a wide range of technical expertise and knowledge on how to integrate and optimise a vast array of technologies with the goal of optimising the performance and reliability of the system. In particular, modelling and simulation tools, complemented by design and control methodologies and supported by advanced experimentation, are the key to addressing the challenges.

This special issue will focus on contributions from authors in the Automotive Research Center (ARC), a multi-university, US Army Center of Excellence, pursuing systems engineering of advanced and alternative powertrains for ground vehicles and methodologies to dramatically improve vehicle fuel economy, performance, reliability and survivability. Particular emphasis is given to progress in modelling and development of simulation tools that cover all areas pertinent to vehicle system analysis, including dynamics and control of vehicles, high performance structures and robust design, occupant safety, advanced high-efficiency engines, energy storage and hybrid propulsion systems. The simulation tools are complemented with methodologies for multidisciplinary design optimisation under uncertainty, estimation of vehicle parameters, characterisation of the subsystems and the vehicle environment and internet-distributed integration of complex systems.