Preface

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Biographical notes: Brendan Chan is a Senior Team Lead at Navistar, Inc. In his current role, he is responsible for the development and analysis of advanced real-time and non-real-time vehicle dynamics models to enhance the full vehicle development process. He received his degree in Electrical Engineering from Michigan Technological University and his PhD in Mechanical Engineering from Virginia Tech, specialising in tyre modelling, vehicle dynamics and multibody dynamics. He is a member of Tau Beta Pi and Eta Kappa Nu and participates as an active Member of American Society of Mechanical Engineers (ASME) and the Society for Automotive Engineers (SAE). In 2012, he was selected as a recipient of the SAE Forest R. McFarland Award. He has authored numerous technical papers, reports, and presentations

in topics related to advanced technologies for ground vehicles for ASME, SAE and SPIE. His areas of expertise and research include advanced designs and concepts for vehicle suspensions and vehicle dynamics, real-time control systems development and chassis systems, which includes braking systems, steering systems and active safety systems.

Lin Li is a Senior Analysis and Simulation Engineer of Liebherr Mining Equipment Newport News Co. He received his BS and MS from Jiangsu University (China), and PhD from Virginia Tech (USA). His areas of research include vehicle dynamics, suspension and tyre modelling and testing, ride comfort, handling, terrain model, and vehicle-terrain-soil interaction. He served as the lead guest editor of the special issue Off-road Vehicle Dynamics of IJVD, as well as an associate editor of SAE Journal of Commercial Vehicles. He is also an active member of SAE Commercial Vehicle Chassis and Suspension Committee and ASME Vehicle Design Committee.

Xiaobo Yang, a SAE Fellow, is currently a Senior Chief Principal Engineer at Oshkosh Corporation. He is focusing on the advancement of vehicle dynamics related research and development with emphasis on standardisation in simulation process, software usage and database management. He previously worked for Chrysler, General Motors, Concordia University and Jilin University. With over 23 years of experiences, he has published numerous technical papers, edited two special issues, one book chapter and given numerous technical presentations or keynote speeches at international conferences and colloquiums. He was the chair for SAE Tire Tests for Road-Load Tire Model Parameters Task Force (2007–2011) and is currently the chair for SAE Material Modelling and Testing Committee. He received the SAE Lloyd L. Withrow Distinguished Speaker Award (2012) and Forest R. McFarland Award (2009). He serves as an Associate Editor of SAE International Journal of Materials and Manufacturing and International Journal of Vehicle Performance. He received his BS, MS and PhD in Automotive Engineering from Sichuan Institute of Technology, Jilin University of Technology and Concordia University, respectively.

Michael Gipser is a teaching professor at Esslingen University of Applied Sciences and co-owner of COSIN scientific software. He specialised in Applied Mathematics at Darmstadt Technical University in 1977, and received his PhD from Darmstadt Technical University in 1982. Previously, he served as the Head of the System Dynamics Group at the (former) Daimler-Benz R&D department. Since then, he has been working on vehicle dynamics fundamental research, including tyre and suspension modelling, mathematical K&C optimisation, simulation technology, computer animation, and mathematics of suspension control systems, such as active suspension and 4WS. Today, his main focus is development and commercialisation of the physics-based tyre simulation model (FTire). He is a member of SAE, being active in standardisation of tyre model parameterisation processes, and a member of Gesellschaft für Angewandte Mathematik und Mechanik (GAMM). He is author or co-author of textbooks on system dynamics and numerical methods, and has published many papers in numerical analyses and simulation-related fields.

The study of tyres has always proved to be an exciting and complex challenge for the engineering community, and there have been advancements that have been achieved by various experts who chose to pursue research in this area. Since the inception of the tyre,

developments in tyre design/construction, materials and dynamics have made it an important part of the vehicle for the improvement of vehicle NVH, vehicle dynamics ride and handling, as well as road-vehicle interaction. The push for increased fuel economy in vehicles has generated engineering requirements that continue to push the envelope of research for road-holding characteristics and NVH.

The complexity of tyres, when considered with all the different subsystems that have to be integrated and optimised for cost, vehicle mobility, braking and tractive performance, safety and reliability implications, opens up an entire world of possibilities for advanced research and development. These possibilities create a wide range of knowledge base and technical expertise, which utilises a vast array of technologies and spans a multitude of areas of engineering and science with the goal of optimising the performance and reliability of the tyre while keeping it a commercially viable product. With the advent of increased computational power, the development of modelling and simulation tools that have the capacity of leading design methodologies and advancements by connecting experimentation with state-of-the-art equipment has become commonplace.

Within this special issue, we hope that there will be more focus on generating articles that showcase advanced developments in tyre modelling, analysis and dynamics. Advances in computational methods offer excellent opportunities for cost reduction and prediction of vehicle response over a much larger range of hypothetical scenarios than can ever be examined through experimental testing. In addition, the development of advanced testing methods that add more depth to the level of analysis on today's tyres will greatly increase our understanding of the dynamics involved in tyres used on vehicles today.

This special issue is intended to be a collection of research articles in various areas. Some of the papers, such as 'An intelligent tyre based adaptive vehicle stability controller' discuss one of the more recent controls systems related developments based on tyres. 'Development of rational tyre models for vehicle dynamics control design and combined vehicle state/parameter estimation' showcases how tyre models can be developed for vehicle parameter estimation and control systems design. 'Development and validation of a FE model of a mining vehicle tyre' shows how finite element analysis can be used to analyse and simulate tyres for mining vehicle simulations. On the fuel economy front, 'Tyre/road interaction model for the prediction of road texture influence on rolling resistance' underscores how important tyres are for fuel efficiency studies, especially in the area of rolling resistance. In addition, one of the more interesting papers on ride in this special issue is 'A ride comfort tyre model for off-highway vehicles', in which the modelling of tyres is combined in a ride application for off-highway applications. Another of the papers, 'A new empirical 'exponential' tyre model' is one of the more recent attempts to develop a new advanced empirical tyre model for vehicle dynamics simulations. Another one of the papers in this issue, 'Cyclic strain rate in tyres as power source to augment automobile autonomy', also explores the development of energy recovery from tyre deformation, which opens up the use of the cyclic strain in tyres as a source of energy. Finally, the interaction between tyre and road is reviewed and discussed in 'Effects of pavement texture on pavement friction: a review'.

We hope that the advanced works collected in this issue not only disseminate the latest progress in the area, encompassing the different areas of tyre-related technology, but also encourage the research efforts of aspiring researchers to contribute to and develop advanced tyre related technologies.