Preface

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Biographical notes: Vladimir V. Vantsevich is a Professor and the founding Director of the MSc in Mechatronic Systems Engineering Program and the Laboratory of Mechatronic Systems at Lawrence Technological University, Michigan. He is a co-founder of the Automotive Engineering Institute. He originated research on inverse vehicle dynamics, and his area of expertise includes mobility, stability, turnability and energy/fuel efficiency optimisation and control of multi-wheel drive vehicles. He is an expert on design of vehicle driveline systems and autonomous wheel power management systems. He is author of five technical books and more than 100 research papers, and he holds 30 certified inventions. He is the Founder and Editor of a series of handbooks, textbooks, and references on Ground Vehicle Engineering at Taylor and Francis Group and also the founding editor of a series of technical books on Robotics Engineering at ASME Press.

Unmanned ground vehicles and autonomous systems for conventional vehicles (with a driver) have recently come into our lives, and they fascinate both researchers and the public all over the world. Indeed, unmanned vehicle competitions, National Robotics Weeks, international and national scientific research and engineering conferences, professional societies, university programs, research journals and series of technical books, and, finally, production of unmanned vehicles and vehicle autonomously operating systems have entered today's world and become a feature that imperatively influences and informs the future for humankind.

Serious discussions on vehicle autonomy and its structural levels have been undertaken by various engineering groups in recent years. There is one course that has not yet attracted much attention – the development of autonomous vehicle dynamics and dynamics of conventional vehicles with autonomously operating systems. Undoubtedly, the factor of 'autonomy' impacts the classical theory of ground vehicles. The major fundamental question in the development of new vehicle dynamics is the right selection of methodological basis on which the theory of autonomous vehicles in motion (and also conventional vehicles with autonomous systems) can be properly developed. Experience in the development of mechatronic systems engineering and manned/unmanned vehicle dynamics shows that the mechatronics approach can be chosen for such foundation of autonomous vehicle dynamics.

Principles of mechatronics engineering have been spontaneously establishing themselves in ground vehicle engineering, mostly through practical engineering work, in the past 40 years. However, only during the last couple of decades has mechatronics been incorporated into a range of education and professional development programs

on a systematic basis. The integrative nature of mechatronics uniquely implements math simulation and optimisation and controls of mechanical, electromagnetic and electronics components. Mechatronics principles, which are used to design mechatronic systems, can be innovatively employed in the development of the theory/dynamics of autonomous ground vehicles and dynamics of vehicles with autonomous systems.

This Special Issue's main goal is to discuss various technical problems of modelling and simulation related to unmanned/manned vehicles using the vehicle mechatronics principles. As this is the first effort of the *International Journal of Vehicle Autonomous Systems* to put into practice vehicle mechatronics principles, all suggestions from readers in this regard will be appreciated by the Editor and further implemented in forthcoming special issues of the *IJVAS*.