
Preface

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Biographical notes: Lingzhong Guo received his PhD in Control Engineering from the Bristol Robotics Laboratory (BRL), UWE, in 2003. He is currently a Lecturer at the Department of Automatic Control and Systems Engineering, The University of Sheffield, UK. His research interest covers system modelling and simulation, nonlinear system identification, adaptive and intelligent control, and analysis and control design for nonlinear PDEs.

Shan Bai received her PhD in Applied Mathematics from the University of Chinese Academy of Sciences in 2008. From 2008 to 2015, she was a post-doctoral researcher at the Max Planck Institute for Gravitational Physics, Germany, University of Burgundy, France, Friedrich Schiller University, Germany, etc. She was a research scientist with the Karlsruhe Institute of Technology in Karlsruhe, Germany. She is an author or co-author of more than 30 papers published in peer-reviewed international journals. Her research interests include high-performance scientific computing, artificial intelligence, deep learning, computer vision and decision support system.

Zhi-Ping Fan is a Professor with the Department of Information Management and Decision Sciences, Northeastern University (NEU), China. He received his BE and MS in Industrial Automation and PhD in Control Theory and Applications from NEU, in 1982, 1986 and 1996, respectively. He was a Research Fellow with the City University of Hong Kong in 2001, 2003 and 2004. He is an author or co-author of more than 60 papers published in international journals. His current research interests include decision analysis, operations research and electronic commerce.

Modelling and simulation (M&S) is a discipline where a computerised and/or mathematical representation of a given system is created, with all or a subset of its components, which is then used to study the behaviour of the system, with the aim to better understand the interaction of its parts, as well as the whole. Nowadays, M&S techniques are widely used in fields as varied as engineering, computer science, physics, chemistry, biology, medicine, economics, etc. Advances in systems engineering, software engineering and computational technologies have enabled the real-time or near real-time M&S of complex systems for optimisation, prediction and analyses. In recent decades, more and more attention has been paid to M&S to investigate complex systems in various sectors and areas for the requirements of

the quick reaction to innovations and improvements. As for the increasing competition, higher demand for quality, lower cost, shorter lifecycles, more complexity and variety of the systems, it is obvious that M&S has been a powerful tool in identifying the bottlenecks and hidden potentials of the systems, verifying the effectiveness of the proposed strategies and evaluating the managerial, operational and control plans.

This special issue collected the revised and expanded papers from the Second International Symposium on Simulation and Process Modelling (ISSPM 2020), Shenyang, China. Its aim is to provide a forum for the scientists, researchers and practitioners to exchange the latest technologies for developing a simulation and process

modelling, particularly in the process modelling, design, simulation, implementation, evaluation, and application of these technologies with energy-aware and environment friendly approaches.

There are eight articles for this special issue ranging from simulation model curation to COVID-19 prediction, which are described briefly as follows:

- 1 ‘A methodology to characterise simulation models for discovery and composition: a system theory-based approach to model curation for integration and reuse’, by Bernard P. Zeigler, presents a systematic approach, based on discrete event system specification (DEVS) formalism, to curate simulation models so that they can more easily be discovered from a model repository given analytical objectives. Moreover, web- and cloud-based technologies are employed for integration and to enable M&S as a service.
- 2 ‘Simulation of pork supply chain based on system dynamics model’, by Qianqian Shao, Xiaojing Zhang, Chong Li and Yang Liu, focuses on the influence of different consumer demand changes (random demand, sudden demand and cyclical demand) on the system behaviour of the pork supply chain (PSC). System dynamics (SD) method is used to build the model of the PSC and the dynamic behaviour of the system are simulated and analysed.
- 3 ‘Simulation optimisation of displaced left-turn intersection layout with multi-objectives’, by Qianqian Shao, Yingcheng Zheng, Yang Liu and Yan Xing, develops a multi-objective optimisation model for intersection with DLT layout (MOOM-DLTL), based on the integrated simulation and mathematical programming (ISMP) framework. The simulation experimental results show that the proposed optimisation method is successful in improving the traffic efficiency of DLT intersection.
- 4 ‘Effect of cap gap and welded seam strength on concrete-filled steel tube arch bridge ribs’, by Zhengran Lu and Chao Guo, provides a finite element analysis for the concrete-filled steel tube rib strength that contained defects. The results show that spiral-welded seam defects have weaker influence on the bearing capacity of CFST than that on empty steel tube.
- 5 ‘Research on travel time prediction of expressway in peak period based on Greenberg model’, by Yan Xing and Yuqing Hao, proposes a three-sectional predictive model of expressway travel time: exit between two cross-sections, entrance between two cross-sections, and no entrance/exit between two cross-sections. The experimental results show the improved efficiency and predicted performance of the proposed method.
- 6 ‘Research on fire escape paths for complex public buildings with multiple starting and end points’, by Yi Zhang, Chi Wang, Wenwen Tong and Tianqi Liu, proposes an improved Dijkstra’s algorithm to study the planning of the shortest escape path from the starting point of the crowds to the security exit of a building. The proposed algorithm is simulated in different scenarios, and the results verify that the proposed algorithm is fast and efficient and can effectively improve the escape efficiency of the crowds, which has strong application value.
- 7 ‘A novel analytical model for estimating vehicle delay at isolated signalised intersections’, by Feng Qiao, Huixin Liu, Dan Luo, Haochen Sun and Yinong Chen, proposes a novel analytical model to estimate the average vehicle delay at signalised intersections under saturated or oversaturated conditions. The simulation results show that the proposed model can provide transportation engineers or professionals with an effective tool for analysing, timing and managing the saturated or oversaturated signalised intersections.
- 8 ‘ARIMA-based time-series analysis for forecasting of COVID-19 cases in Egypt’, by Ibrahim Sabry, Abdel-Hamid Ismail Mourad, Amir Hussain Idrisi and Mohamed ElWakil, develops a mathematical model using COVID-19 data collected from the Egyptian Ministry of Health in order to examine the distribution of COVID-19 in Egypt. The analysis suggests a growth trajectory for the events in the days to come. The model forecasts would help the government and medical personnel to plan themselves for the coming conditions and make healthcare systems more ready.

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