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## Editorial

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### Li Xia\*

Center for Intelligent and Networked Systems (CFINS),  
Department of Automation,  
Tsinghua University,  
Beijing, 100084 China  
Email: xial@tsinghua.edu.cn  
\*Corresponding author

### Jie Song

Department of Industrial and Management Engineering,  
College of Engineering,  
Peking University,  
Beijing, 100871, China  
Email: jie.song@pku.edu.cn

### Hui Xiao

Department of Management Science and Engineering,  
School of Statistics,  
Southwestern University of Finance and Economics,  
Chendu, 611130, China  
Email: msxh@swufe.edu.cn

### Enlu Zhou

H. Milton Stewart School of Industrial and Systems Engineering,  
Georgia Institute of Technology,  
Atlanta, GA 30332, USA  
Email: enlu.zhou@isye.gatech.edu

**Biographical notes:** Li Xia is an Associate Professor with the Center for Intelligent and Networked Systems (CFINS), Department of Automation, Tsinghua University, Beijing China. He received his BSc and PhD in Control Theory in 2002 and 2007, respectively, both from Tsinghua University. After graduation, he worked at IBM Research China and KAUST Saudi Arabia. Then, he returned to Tsinghua University as a faculty member in 2011. He was a Visiting Scholar in the Stanford University, the Hong Kong University of Science & Technology. He serves/served as a program committee member of a number of international conferences. His research interests include the methodology research in stochastic optimisation, queuing theory, Markov decision processes, and the application research in building energy, energy internet, production systems, and internet of things. He is a senior member of IEEE.

Jie Song is an Associate Professor with the Department of Industrial and Management Engineering at the Peking University, Beijing, China. She received her BS in Applied Mathematics from the Peking University, Beijing, China in 2004, and MS and PhD in Industrial Engineering from the Tsinghua University in 2007 and 2010, respectively. She has been a Research Fellow in the Georgia Institute of Technology from 2007 to 2008, and during 2010 to 2012, she was a Postdoc Fellow in the Department of Industrial and System Engineering, University of Wisconsin Madison. She is a member of INFORMS and IEEE. Her research interests are simulation optimisation and stochastic modelling in the application areas of logistics, healthcare and production. She is a recipient of the Best Paper Award at the 2014 IEEE Conference on Automation Science and Engineering.

Hui Xiao is an Associate Professor with the Department of Management Science and Engineering, School of Statistics, Southwestern University of Finance and Economics, Chengdu, China. He received his PhD from the National University of Singapore in 2013. He served as a program committee member of 2016 International Conference on Quality, Reliability, Risk, Maintenance, and Safety Engineering and a Section Chair of the 2015 International Research

Conference on Systems Engineering and Management Science. His research interests include optimal computing budget allocation, simulation optimisation with application to service management, reliability modelling and maintenance optimisation.

Enlu Zhou received her BS with highest honours in Electrical Engineering from the Zhejiang University, China in 2004, and PhD in Electrical Engineering from the University of Maryland, College Park in 2009. From 2009 to 2013, she was an Assistant Professor in the Industrial and Enterprise Systems Engineering Department at the University of Illinois Urbana-Champaign. Since 2013, she has been in the H. Milton School of Industrial and Systems Engineering at Georgia Institute of Technology. Her research interests include Markov decision processes, simulation optimisation, and Monte Carlo statistical methods, with applications in financial engineering and revenue management. She is a recipient of the Best Theoretical Paper award at the 2009 Winter Simulation Conference, AFOSR Young Investigator award in 2012, and NSF CAREER award in 2015.

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## 1 Introduction

It is our great pleasure to launch the special issue on simulation modelling and optimisation of large-scale systems. Simulation is an efficient methodology to study complicated systems in which the system dynamic is driven by discrete events and the analytical study is usually inapplicable. It has grown exponentially fast in recent decades as powerful computers have become widely available. Simulation-based optimisation is widely used to analyse and improve the performance of many engineering systems, especially for the large scale and complex systems where the analytical or closed-form analysis is impossible for such systems. In practice, there are many man-made engineering systems belong to such categories, such as manufacturing systems, communication systems, power systems, transportation systems, supply chain and logistics systems, healthcare systems, financial engineering, to name just a few. The complexity of such systems increases exponentially when the system scale increases, which makes the analysis and optimisation of such systems become more intractable. With the advances of computation technology and optimisation theory, the simulation-based optimisation methodology provides a feasible way to model, simulate, analyse, and optimise such complex systems. Especially, the newly emerging techniques, such as the energy internet, the internet of things, industry 4.0, and big data, are leading a revolution of our world. The successful implementation of these new techniques requires more developments and progresses of the simulation-based optimisation theory. We hope that this special issue may make a good reference material and be of great use for both the researchers and practitioners in the field of simulation modelling and optimisation.

## 2 Content of this special issue

This special issue includes ten papers submitted from all over the world. The topics of the papers are diverse in the following aspects: three papers study the theoretical problems of simulation-based optimisation, two of which are about the multi-objective optimisation problem (Liu et al.; Shi and Celik) and one is about the supermarket model in queueing systems (Li et al.); the other seven papers are application-oriented: Elloumi and Kamoun present a simulation study of hydraulic processes, Yang studies a classification problem in financial engineering, Cao et al. study the speed optimisation problem for trains, Li and Pedrielli study an optimisation problem of shipment policy in a return supply chain, Hsieh et al. study a packaging problem of integrated circuits using a multi-fidelity simulation model, Shen et al. study a dispatch matching problem between the renewable energy supply and the demand in an isolated power system, and finally, He et al. conduct a simulation study on the outpatient appointment scheduling problem in hospitals. All these papers present an impressive study from the problem modelling and simulation to the analysis and optimisation, using the advanced techniques of simulation-based optimisation theory.

The guest editors of this special issue would like to express their appreciation to all the authors for their valuable and original work, especially to express their sincere gratitude to Professor Chun-Hung Chen from George Mason University, USA, and the Editor-in-Chief, Professor Feng Qiao, for their continued support. Without their help, we could not have this successful special issue.