LSMS & ICSEE 2020

The 2020 International Conferences on Life System Modeling and Simulation (LSMS2020) &The 2020 Intelligent Computing for Sustainable Energy and Environment (ICSEE2020)

October 25, 2020, China

Final Program

Sponsors

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Contents

Welcome Address

This book constitutes the proceeding of the 2020 themed workshops on smart energy systems, intelligent manufacturing, and bioinformatics and life system modelling, as part of the 2020 International Conference on Life System Modeling and Simulation (LSMS2020) and 2020 International Conference on Intelligent Computing for Sustainable Energy and Environment (ICSEE2020). Due to the pandemic situation, the organizing committee has decided to postpone the two conferences to Oct 2021, while themed workshops are organized online at 25, Oct 2020. The themed workshops to bring together international researchers and practitioners in the fields of advanced methods for smart energy systems, intelligent manufacturing, and intelligent biological systems and information systems. These events are built upon the success of previous LSMS conferences held in Shanghai, Wuxi and Nanjing in 2004, 2007, 2010, 2014 and 2017, and ICSEE conferences held in Wuxi, Shanghai and Nanjing in 2010, 2014 and 2017 respectively, and are based on large-scale UK-China collaboration projects on sustainable energy.

At the themed workshops, technical exchanges within the research community took the form of keynote speeches, and oral presentations. The themed workshops received over 165 submissions. All papers went through a rigorous peer review procedure and each paper received at least three review reports. Based on the review reports, the Program Committee finally selected 38 high-quality papers for presentation at the themed workshops for LSMS 2020 and ICSEE 2020. These papers covering the above three topics are included this CCIS proceeding published by Springer.

The organizers of LSMS2020 and ICSEE 2020 would like to acknowledge the enormous contribution of the Program Committee and the referees for their efforts in reviewing and soliciting the papers, and the Publication Committee for their editorial work. We would also like to thank the editorial team from Springer for their support and guidance. Particular thanks are of course due to all the authors, as without their high-quality submissions and presentations the conferences would not have been successful.

Finally, we would like to express our gratitude to our sponsors and organizers, listed on the following pages.

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Plenary Speeches

Plenary Speech 1

Sunday, October 25 (13:25 - 14:10)

Modelling of system frequency response for hybrid power systems

Prof. Jianhua Zhang

North China Electric Power University, China

Abstract：In this talk, system identification algorithms for wind-thermal integrated power systems are investigated and applied to obtain their equivalent models. In order to deal with nonlinearities and non-Gaussian disturbances, the survival information potential (SIP) of identification errors is employed to construct the performance index during training neural networks. Neural networks based modelling methods are then utilized to build system frequency response model for hybrid power systems. Simulation results testified the effectiveness of the proposed system identification algorithms.

Bio-sketch: Jianhua Zhang is currently a Professor in School of Control and Computer Engineering at North China Electric Power University, Beijing, China. She obtained her Bachelor, Master and PhD degree at North China Electrical Power University, North China Electrical Power University Beijing graduate school, Beijing University of Aeronautics and Astronautics in 1990, 1993, 1996, respectively. She was a visiting senior research fellow at UMIST in UK from Jan 2000 to Jan 2001, and visited Chung Yuan Christian University from July to August 2008 funded by Taiwan Chunghwa development foundation. She was a senior visiting scholar at University of Manchester in UK from February to March 2014. She was a visiting professor at Queen's University Belfast (QUB) from September to October 2015 sponsored by Newton funding of the Royal Society. Her research interests include the areas of stochastic control, fault diagnosis and integrated energy system.

Plenary Speech 2

Sunday, October 25 (14:10 - 14:55)

Robust control under worst-case uncertainty for unknown nonlinear systems using modified reinforcement learning

Prof. Wen Yu

Departamento de Control Automático

National Polytechnic Institute Mexico City, Mexico

Abstract： Reinforcement learning (RL) is an effective method for the design of robust controllers of unknown nonlinear systems. Normal RLs for robust control, such as actor critic (AC) algorithms, depend on the estimation accuracy. Uncertainty in the worst case requires a large state-action space, this causes overestimation and computational problems.

In this talk, the RL method is modified with the k nearest neighbor and the double Q-learning algorithm. The modified reinforcement learning does not need the neural estimator as AC and can stabilize the unknown nonlinear system under the worst-case uncertainty. The convergence property of the proposed RL method is analyzed. The simulations and the experimental results show that our modified RLs are much more robust compared to the classic controllers, such as the PID, the sliding mode and the optimal linear quadratic regulator (LQR) controllers.

Bio-sketch: Wen Yu received the B.S. degree in automatic control from Tsinghua University, Beijing, China in 1990 and the M.S. and Ph.D. degrees, both in Electrical Engineering, from Northeastern University, Shenyang, China, in 1992 and 1995, respectively. From 1995 to 1996, he served as a lecturer in the Department of Automatic Control at Northeastern University, Shenyang, China. Since 1996, he has been with CINVESTAV-IPN (National Polytechnic Institute), Mexico City, Mexico, where he is currently a professor with the Departamento de Control Automatico. From 2002 to 2003, he held research positions with the Instituto Mexicano del Petroleo. He was a Senior Visiting Research Fellow with Queen's University Belfast, Belfast, U.K., from 2006 to 2007, and a Visiting Associate Professor with the University of California, Santa Cruz, from 2009 to 2010. He also holds a visiting professorship at Northeastern University in China from 2006. Dr.Wen Yu serves as associate editors of IEEE Transactions on Cybernetics, Neurocomputing, and Journal of Intelligent and Fuzzy Systems. He is a member of the Mexican Academy of Sciences.

Plenary Speech 3

Sunday, October 25 (14:55 - 15:40)

Load Frequency Control of Power Systems under an Open Network Environment

Prof. Chen Peng

Shanghai University, China

Abstract： In this talk, a time delay distribution-dependent load frequency Control (LFC) of power systems was introduced; then, an adaptive event-triggered LFC of power systems was discussed under consideration of limited network bandwidth; thirdly, a resilient event-triggered secure control for power systems was introduced under consideration of malicious attacks. At last, conclusion and prospect were given in this field.

Bio-sketch: Chen Peng is currently a Professor in School of Mechatronic Engineering and Automation at Shanghai University, Shanghai, China. He obtained her Bachelor, Master and PhD degree at Chinese University of Mining Technology University, Xuzhou, China in 1996, 1999 and 2002, respectively. He was a Research Associate with the University of Hong Kong, Hong Kong. From 2006 to 2007, he was a Visiting Scholar with the Queensland University of Technology, Brisbane, QLD, Australia. From 2011 to 2012, he was a Post-Doctoral Research Fellow with the Central Queensland University, Rockhampton, QLD, Australia. In 2012, he was appointed as an Eastern Scholar by the Municipal Commission of Education, Shanghai, China. In 2018, he was appointed as an Outstanding Academic Leader by the Municipal Commission of Science and Technology, Shanghai. His current research interests include networked control systems, distributed control systems, security control, and intelligent control systems. Prof. Peng was a recipient of the one of the Most Cited Chinese Researchers Award in Computer Science by Elsevier from 2014 to 2019. He is an Associate Editor of a number of international journals, including IEEE Transaction on Industrial Informatics, Information Sciences and Transactions of the Institute of Measurement and Control.