Editorial

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Biographical notes: Ikuro Mizumoto received his BE, ME and DrEng in Mechanical Engineering from Kumamoto University, Kumamoto, Japan in 1989, 1991 and 1996, respectively. Since 1991, he has been with Kumamoto University, where he is currently an Associate Professor in the Department of Intelligent Mechanical Systems. His research interests over last few years have been adaptive control system design, robust adaptive control and output feedback-based control for non-linear systems and their applications.

This is the special issue composed of selected papers from the 2010 International Conference on Modelling, Identification and Control (ICMIC '10). It was held at the Okayama University, Japan, July 17–19, 2010. In this special issue, five technical contributions on modelling, identification and control focused on practical applications, which are selected from ICMIC 2010, are provided. The contents of these studies are briefly described as follows:

In the paper entitled 'Identifying individuals from gait pattern using waist-mounted accelerometer' by Yuexiang Li, Xiaobo Wang and Feng Qiao, a novel algorithm to identify individuals via gait pattern by waist-mounted MEMS accelerometer is presented. In the proposed method, vertical acceleration signal is selected and represented as a seven-feature-tuple extracted from continuous wavelet transform. Through divided vertical acceleration signals into cycles, endpoint features and curve features are used to present the original signals. Further, a multi-criterion model is designed to match the feature sequences using dynamic time wrapping (DTW) algorithm. The proposed method will significantly reduce the size of gait templates data storage. In order to illustrate the effectiveness of the proposed method, an experiment with a dataset of 24 subjects is demonstrated and it is shown that the equal error rate of the proposed algorithm has achieved 5% which is superior to that of 6.4% and 6.7% in the previous work.

The paper entitled 'Anti-theft monitoring system for street lamp cable' by Xiangjun Zeng, Guangming Jin, Yuanyuan Wang and Xiaoxi Hu, presents a novel anti-theft monitoring system based on measuring the parallel resonant frequency. In this paper, the model and equivalent circuit for street lamp is first presented to calculate the resonant frequency. The measured frequency and the measured number of street lamp are then calculated to distinguish whether the cable of street lamp is stolen or not, and to locate the stolen cable point. The proposed scheme will be verified by EMTP simulation, and a fault detection prototype is developed and tested in the laboratory. The results show that the proposed method can detect reliably if the cable of street lamp is stolen, and can locate accurately where the theft is occurred.

In the paper by Aixiang Zeng, Xiao'an Qin, Yuanyuan Wang and Hui Pan, entitled 'EHV transmission lines fault protection with HHT energy spectrum', a novel non-unit transient protection based on HHT energy spectrum is developed for extra high voltage (EHV) transmission lines protection in order to solve the problems in the traditional double-terminal travelling wave protection schemes for EHV which are unable to satisfy the requirement of power systems stability and economy. The paper analyses the travelling-wave characteristics between internal faults and external faults. In the proposed method, intrinsic mode functions (IMF) of travelling wave are extracted by the empirical mode decomposition (EMD). And then Hilbert-Huang transform (HHT) is utilised to calculate the corresponding instantaneous frequency of each IMF component to obtain energy spectrum. Taking into account the difference that the travelling wave high frequency components energy caused by the internal faults is larger than that caused by the external faults due to the influences of line trap and bus-to-ground capacitance, the energy spectrum is applied to distinguish the internal and external fault. Through EMTP simulations, it will be shown that, under different fault conditions, the proposed scheme can distinguish reliably the internal faults from external faults and protect the whole transmission line with high sensitivity.

In the paper entitled 'Compensation of play operator-based Prandtl-Ishlinskii hysteresis model using a stop operator with application to piezoelectric actuators' by Zhi Li, Omar Aljanaideh, Subhash Rakheja, Chun-Yi Su and Mohammad Al Janaideh, a method to compensate the inherent hysteresis non-linearity of piezoelectric actuators is proposed in order to improve the tracking performance in precision control. The hysteresis behaviour of piezoelectric actuators is described by a play operator-based Prandtl-Ishlinskii (PPI) model, and to cancel/remove such a hysteresis non-linearity, a corresponding stop operator-based Prandtl-Ishlinskii (SPI) model is utilised to

compensate it. To this end, the two parameters describing the SPI model, the thresholds and the weights, are analytically derived based on the PPI model. In order to illustrate the effectiveness of the proposed compensator, experiments through a piezoelectric micro-positioning stage will be demonstrated. The experimental results show that the SPI model can serve as an effective feedforward compensator and can thus enhance the tracking/positioning precision of the piezoelectric actuators.

The paper entitled 'Grasp and transport control for a chopsticks-type robot using work control' by Yojiro Yamasaki, Toru Tsumugiwa and Ryuichi Yokogawa, presents a method of work control to maintain a constant amount of work done by the robot on an object. Further the method of work control and a method for changing the control mode based on position and force errors, called the 'SCOME method', are applied to a two-fingered robot hand composed of elastic joints, which is called a chopsticks-type robot. The proposed work control has a function that can appropriately and autonomously changes the target value of torque for grasping in accordance with the softness of the object. In order to validate the proposed grasp and transport control and work control, in this paper, various grasp and transport control experiments were conducted using the chopsticks-type robot to manipulate cylindrical objects with different rigidities and the results illustrate the effectiveness of the proposed grasp and transport control and work control for the chopsticks-type robot.

Acknowledgements

As a guest editor of this special issue, I would like to thank all the authors for their contributions and wish that the readers can benefit from the above five papers. Finally, I would also like to appreciate the reviewers' excellent job on evaluating these papers.