Editorial

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Biographical notes: Zongli Lin is a Professor of Electrical and Computer Engineering at the University of Virginia. He received his PhD in Electrical and Computer Engineering from Washington State University in 1994. His current research interests include non-linear control, robust control and control applications. He was an Associate Editor of the *IEEE Transactions on Automatic Control* (2001–2003). Currently, he serves on the editorial boards of several journals, including *Automatica, Systems & Control Letters*, *IEEE/ASME Transactions on Mechatronics* and *IEEE Control Systems Magazine*. He is an elected member of the Board of Governors of the IEEE Control Systems Society. He is a Fellow of the IEEE.

Huijun Gao is a Professor of Harbin Institute of Technology. He received his PhD in Control Science and Engineering from Harbin Institute of Technology in 2005. His research interests include network-based control, robust control/filter theory, time-delay and multidimensional systems, and their applications. He serves as an Associate Editor for several journals, including *IEEE Transactions on Systems, Man and Cybernetics-Part B: Cybernetics*, *Journal of Intelligent and Robotic Systems*, and *Int. J. Systems Science*. He was the recipient of the National Excellent Doctoral Dissertation Award and the National Outstanding Youth Science Fund Award, in 2007 and 2008, respectively.

Mechanical systems are a classical subject of study. Mechanical systems are truly ubiquitous. We could find a mechanical system in everything around us, including our own bodies. The integration of electronics and mechanical systems has led to the new subject of study, Mechatronics, and presents new challenges and opportunities for both mechanical and electrical engineers, and in particular, control engineers among them.

It is thus not surprising that there are many papers accepted and presented at the 2nd International Conference on Modelling, Identification and Control (ICMIC'08), Shanghai, China, 29 June–July 2008. At the invitation of the organisers of this conference as well as that of the editor-in-chief Professor Quan Zhu of *Int. J. Modelling, Identification and Control*, we are pleased to organise this special issue from the papers presented at the ICMIC'08. Among the many quality papers, we have selected only 17 of them in part due to space limitation of a special issue. We believe that this collection of papers represents a glimpse of the current scope of study on mechanical systems.

The contents of these 17 papers are briefly described as follows.

In the paper 'Modelling and simulation of throttle slice stress of telescopic shock absorber', Changcheng Zhou, Xueyi Zhang, Wei Xu and Jian Guo analyse the deformation, internal forces and stress of the throttle slice of a telescopic shock absorber.

In the paper 'Simulation of telescopic shock absorber outer characteristic with piecewise maths function', Changcheng Zhou, Xueyi Zhang, Je Meng and Leilei Zhao analyse the pathway throttle and local throttle loss of oil fluxion of a telescopic shock absorber and show the curves of pathway loss coefficient and equivalent length of piston hole vs. the shock absorber velocity.

In the paper 'Design and simulation of a nano-scale micro positioning stage', Xiaohui Xie, Ruxu Du and Qiang Sun present a new micro positioning stage including its design, simulation and optimisation. Micro positioning stage is a commonly used platform in Microelectronics (MEMS).

In the paper 'Design and kinematics simulation of a high-speed sewing machine', Xiaohui Xie, Qiang Sun and Ruxu Du consider the requirements of high speed sewing. A best mechanical structure is chosen for each of the four mechanisms that make up an industrial sewing machine: the

take-up mechanism, the needle piercing mechanism, the fabric feeding mechanism and the bobbing mechanism.

In the paper 'Research on influence of rolling parameters on the rolling process based on numerical simulation', Licheng Yang, Jingxiang Hu, Liwei Ning and Yingchun Liu use the finite element method to study the large plastic deformation, thermo-mechanical coupling and complex boundary conditions between rollers and billet in the rolling process, which involves geometric non-linearity, material non-linearity and boundary non-linearity, and thus prevents an analytical approach.

In the paper 'Analysis of dynamic performance simulation for turn-milling centre', Lida Zhu, Tianbiao Yu, Junming Hou, Xingyu Jiang and Wanshan Wang propose a co-simulation method for rigid-flexible coupling systems in order to obtain more accurate dynamic performance of turn-milling centre. The co-simulation method is fulfilled by integrating finite element analysis and multi-body simulation.

In the paper 'Semiactive control of a base isolated building using magnetorheological dampers', Mauricio Zapateiro, Ningsu Luo and Hamid Reza Karimi present a methodology that leads to seismic vibration suppression of a class of based isolated civil structures by means of magnetorheological (MR) dampers. In particular, Bouc-Wen model is used to describe the dynamics of an MR damper and adaptive backstepping controller is developed to explore its performance in seismic vibration suppression.

In the paper 'Research on the control and simulation of vehicle suspension systems', Chuan Yin Tang, Tian Xia Zhang, Wei Zhou and Wanke Gao present a four degree-of-freedom half-body dynamic model of vehicle active suspension system, model the road roughness height as a filtered white noise stochastic process, and propose a fuzzy control system of the active suspension.

In the paper 'Rotordynamic analysis of machines on active magnetic bearings: comparison to fluid film bearing machines and vibration specifications', Paul Allaire, Timothy Dimond and Zongli Lin consider rotordynamic modelling of a flexible rotor supported on active magnetic bearings (AMBs) and compare the process to a similar process for fluid film bearings (FFBs). They discuss comparative studies of rotors on AMBs and FFBs involving critical speeds, AMB and FFB stiffness and damping values, mode shapes and forced response.

In the paper 'Optimisation of the prefabricated starting notch's parameters in the numerical simulation model of fracture splitting connecting rod', Yanju Wang, Shuqing Kou, Shenhua Yang and Wenming Jin present a numerical simulation model of the fracture splitting connecting rod by the FEM software MSC.Marc.

In the paper 'Research on preparation device for washing red cell', Yufeng Yao, Bo Huang and Hongxia Sun discuss the heavy dependency of the conventional manual washing red cell on centrifugal methods and extrusion techniques and report on a successful development of a preparation device for washing red cell with proprietary intellectual property rights.

In the paper 'The simulation and analysis of stresses field of ceramic die in wire drawing process', Xuefeng Yang, Xiangbo Ze, Hongyan Wang, Hui Wang and Hui Zhang use the finite element method to simulate the stresses distribution and force situation of die in order to study the stresses distribution of ceramic die in drawing process.

In the paper 'Analysis of dynamic characteristic and structure optimisation for hybrid machine tool', Chunxia Zhu, Lida Zhu, Jianrong Wang, Cong Su and Wanshan Wang investigate the basic theory of exciting vibration and the principle of exciting vibration test on dynamic characteristic of a hybrid machine tool. A new simulation method which can effectively improve the dynamic characteristic of hybrid machine tool is proposed.

In the paper 'Simulation of cold roll forming using elastic–plastic finite element method', Xia Chen, Qingming Chang, Jiao Wang and Changjun Chen analyse the longitudinal strain of the tube in the course of roll shaping based on large deformation elastic-plastic finite element analysis. They also study the influence of different forming parameters, such as the forming speed, the material properties and the friction coefficient.

In the paper 'Dynamic model building of thickness control system for 4-high rolling mill and H_∞ robust controller design', Jianliang Sun, Yan Peng and Hongmin Liu present an integral dynamic model of a rolling mill, which includes the rolling process model, the dynamic model of mill stand-rolls and the dynamic model of hydraulic servo system. Based on the linearisation of these models, an H_∞ robust controller is designed for the thickness control system.

In the paper 'An active disturbances rejection controller for hysteretic systems', Zengqiang Chen, Jiaxiang Zhao and Zhuzhi Yuan present an active disturbance rejection controller (ADRC) for a class of single-input-single-output non-linear systems with a hysteresis non-linearity represented by the Preisach model. It is shown by simulation that the ADRC controller with a set of invariable parameters achieves ideal tracking performance.

In the paper 'Active disturbances rejection decoupling control for active magnetic bearing multivariable system', Huangqiu Zhu, Jiaju Chen and Xiaodong Sun put forward an active disturbance rejection decoupling control strategy for active magnetic bearing (AMB) multivariable systems. The control system configuration is built and the corresponding control algorithm is given.

The 17 papers included in this special issue cover a wide spectrum of modelling, identification and control of mechanical systems. It is our wish that this special issue provides a good glimpse of topics of research in this important subject of study and will help stimulate more research.