Editorial

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Overall I feel that papers in this special issue on modelling and control of electrical systems cover a wide spectrum of this highly important research field. These papers give a clear indication of the present state of play and point to exciting opportunities for future research programmes and investigations in the years ahead.

In the paper, 'NLPQL of control rules for improving fuel economy of a parallel hydraulic hybrid bus', Ye-cui Yan et al. introduce briefly how the hydraulic hybrid system can significantly improve fuel economy of conventional buses over an urban bus-driving cycle by about 30%. They suggest that for further improvement of bus fuel economy, non-linear programming by quadratic Lagrangian (NLPQL) can be applied for optimising the control rules.

In the paper, 'Sensorless control of PMSM based on adaptive sliding mode observer', Shuai Guo and Jinbao He present briefly a novel speed and position sensorless control method for permanent magnet synchronous motors (PMSM) based on a sliding mode observer. They then discuss in detail the estimated rotor speed and position through a Lyapunov function.

In the paper 'Feasibility analysis of portable electromagnetic localisation method for in-vivo micro robot from modelling, calibration, experiments and electromagnetic safety', Hongwei Li et al. show how micro invasive medical robots have great potential in clinical application. Their devised portable AC electromagnetic localisation method for the in-vivo micro robot is proved to be safe for human applications.

In the paper, 'Modelling process of electrical contact rivet through finite element simulation', Eric Gayral et al. present reliability of the electrical contact riveting process with the aid of non-linear finite element modelling. They have assessed the validity of the model through a dedicated experimental test rig. A close correlation between the modelling and the experimental results is also reported.

In the paper, 'Integral variable structure current control of DFIG-based wind turbines near cut-in speed', Changliang Xia et al. discuss a novel integral variable structure controller for current control of variable speed doubly fed induction generator (DFIG) wind turbines near cut-in wind speed. Their proposed current controller not only ensures generators' safe cut-in switches to the grid, but also maximises the energy capture.

In the paper, 'Modelling and simulation of control system for brushless DC motor', Hua Ji and Zhiyong Li modelled the brushless DC motor with its associated control components such as speed PI controller block, current hysteresis controller block, current reference block, inverter block and commutation logic block, within Matlab/Simulink environment. Their proposed simulation model provides a foundation for the design of actual motor control system.

In the paper, 'A comparison and simulation study of robust excitation control strategies for single-machine infinite bus power system', Zhaozhun Zhong and Jingcheng Wang discuss the robust excitation control strategies for a single-machine infinite bus power system from comparisons between the linear guaranteed cost robust control strategy and the nonlinear robust passive control strategy.

In the paper, 'Moving-boundary full scope simulation model of ultra-supercritical once-through boiler', Ershu Xu et al. discuss that according to the structural and operating characteristics of the ultra-supercritical once-through boiler, the moving-boundary full scope simulation model can be based on parameters such as mass balance, energy balance and momentum balance. They have shown that the model can accurately model dynamic and static characteristics of an ultra-supercritical once-through boiler up to 600 MW.

In the paper, 'Modelling and simulating of GTCC system with CO_2 removal plant using Aspen Plus', Rongrong Zhai et al. discuss the CO_2 capture and storage (CCS) from power plants for the control of greenhouse gas emissions. They have introduced a technique for the removal of CO_2 based on the absorption/regeneration process with monoethanolamine (MEA) solutions, using ASPEN Plus.

In the paper, 'A fuzzy-PID controller with adjustable factor based on S7-300 PLC', Xingqiao Liu et al. discuss the design of a fuzzy-PID controller with adjustable factor. The fuzzy control algorithm is organised in STEP7 software and then downloaded in S7-300 PLC. Data communication between S7-300 PLC and WinCC is achieved by MPI. The fuzzy-PID controller demonstrates better robust capability and stability in controlling complex long time-varying delay.

In the paper, 'Study on double motor synchronous system of neural network control', Chong Chen et al. have established the mathematical model of a double motor synchronous system. They then combine the decoupling

technology of an adaptive neuron decoupling compensator and the RBF neural network adaptive PID controller to design the neural network controller of the two-motor synchronous system.

In the paper, 'Self-tuning control of dead time compensation strategy for PMSM control', Qiao Zhang et al. describe a self-tuning predictive control strategy for a permanent magnet synchronous motor (PMSM) drive with dead time. The dead time compensator (DTC) is based on the Smith predictor (SP) and the self-tuning (ST) proportional-integral (PI) follows the model following controller (MFC) concept. They then verify the proposed control scheme through experimental results.

In the paper, 'Research on synchronous generator automatic quasi-synchronising device', Xiaoying Zhang et al. discuss a new-style generator quasi-synchronising device based on AT89S52 SCM and CPLD. The AT89S52 and CPLD act as the core in the hardware design and the hardware includes eight modules. The configuration program concept is adopted in the software design that includes a main program and subprograms.

In the paper, 'The design and control on intelligent underwater cleaning robot for power plant condenser', Hui Zhang et al. discuss a novel method for online steam condenser fouling cleaning based on a high pressure cleaning method in conjunction with chemicals through a new autonomous cleaning robot. The robot system structure consists of mechanical and electrical parts where the distributed control system is used to improve cleaning efficiency.

In the paper, 'Modelling and control of an internal combustion linear generator integrated power system', Zhaoping Xu and Siqin Chang present the internal combustion linear generator integrated power system as a novel type of internal combustion engine with free piston. The system is characterised by direct conversion of the combustion into electrical energy without rotary motion. Their devised mathematical model is based on dynamic and thermodynamic differential equations which describe the motion. Their designed hierarchical controller is embedded into the model for optimum conversion.