

EDITORIAL

Dear reader,

You have at your desk the issue no. 4/2016 of the journal AUTOMATIKA, which contains 19 original scientific papers in the fields of signal processing, power systems, electric drives, control systems, robotics, electronics and telecommunications.

In the first paper, **Intelligent Fault Detection in Power Distribution Systems Using Thermograms by Ensemble Classifiers**, authors Milad Niaz Azari et al. present a systematic method in which areas of power distribution system, suspected of failure, are identified through computer-aided thermal image processing. Tests show that applying the presented algorithm leads to a faster intelligent fault detection and higher reliability, especially in widespread networks, which can be seen as a validation approach for the proposed method. The second paper entitled **A new optimization formulation for determining the optimum reach setting of distance relay zones by probabilistic modeling of uncertainties** by Mohammad Shabani et al. proposes a new approach in the power system safety design. Authors use indices of sensitivity and selectivity for each zone of the distance relay to formulate the objective function and model the uncertainties based on their probability density functions. Solution of the obtained problem is found by employing the particle swarm optimization. The results of the proposed approach are compared with the conventional approach on an example of a 9-bus network. The following paper entitled **Optimal Location and Setting of FACTS Devices for Reactive Power Compensation Using Harmony Search Algorithm** by D. Karthikaikannan and G. Ravi investigates reactive power compensation in the operation and control of power system. Harmony Search Algorithm is used to determine the optimal location and setting of Static Var Compensator and Thyristor Controlled Series Capacitor. A comparison of simulation results reveals the effectiveness of proposed algorithm over other well established population based optimization technique like Simple Genetic Algorithm, Particle Swarm Optimization and Differential Evolution. The following paper, **Simulation and Control Strategy of a 5.6kV 17-level STATCOM Under SVG Condition**, by Hongchang Sun, Fengyu Zhou and Yugang Wang, presents 17-level STATCOM concept with mathematical model, phase-shifted modulation and corresponding reactive power control. The fifth paper entitled **Comparative performance investigation of optimal controller for AGC of electric power generating systems** by Pankaj Dahiya et al. quantifies performance indicators of the considered AGC system with respect to different approaches for the optimal controller design. Designed control systems are verified in simulations by considering sudden load perturbations. Robustness of designed controller is confirmed with a sensitivity study. K. D. E. Kerrouche et al. in their paper entitled **A comprehensive review of LVRT capability and sliding mode control of grid-connected wind-turbine-driven doubly fed induction generator** present a comprehensive review of several strategies applied to improve the Low Voltage Ride-Through capability for grid-connected wind-turbine-driven Doubly Fed Induction Generator (DFIG). The main objective of this study is to take into account grid requirements over LVRT performance under grid fault conditions using software solution based on Higher Order-Sliding Mode Control. The LVRT capacity and effectiveness of the proposed control method, compared to the conventional First Order Sliding Mode, are validated by time-domain simulation studies under Matlab on a 1.5 MW wind-turbine-driven DFIG. The paper entitled **Modeling and Control of Bulk Material Flow on the Electromagnetic Vibratory Feeder** by Petar J. Mišljen et al. presents the results of modeling, simulation and experimental research of the bulk material flow

on the electromagnetic vibratory feeder (EVF). The stated contributions of the paper are: i) modeling of the EVF, ii) implementation of the flow control algorithm of bulk material on EVF, iii) experimental verification of the model and iv) definition of the parameters that enable the selection of energy-efficient operating point of the EVF. The paper, **Induction motor inter-turn fault modeling and simulation using SSFR test for diagnosis purpose** by Abdelhakim Mabrek and Kamel E. Hemsas, proposes an equivalent-circuit model for simulating inter-turn short circuits in a squirrel-cage induction machine with provided performance comparison on a real 250 W motor by using SSFR tests. The following paper, **Modeling PD Closed-loop Control Problems with Fuzzy Differential Equations**, by Nohe R. Cazarez-Castro et al. reports a fuzzy differential equations approach for the modeling of initial condition uncertainty for a proportional derivative closed-loop control of a direct current motor. Authors present analytic and numerical results for the position regulation problem for ideal case and also considering perturbed initial conditions. Padideh Rasouli et al. in their paper entitled **Output Feedback Look-ahead Position Control of Electrically Driven Fast Surface Vessels** present the design of a trajectory tracking controller for fast underactuated ships in the presence of model uncertainties without velocity measurements in the yaw and surge directions. Furthermore, an adaptive robust control technique is adopted to cope with the parametric and non-parametric uncertainties in the model, and Lyapunov-based stability analysis is utilized. Simulation results are presented to illustrate the feasibility and efficiency of the proposed controller. In the following paper, **Robust Adaptive Observer based on Multi wheeled Mobile Robot Cooperation Algorithm** by Hrizi et al. an intelligent cooperative diagnosis algorithm is proposed and tested for a group of mobile robots. The diagnosis algorithm is based on robust adaptive unknown input observer applied on unobservable robot. To illustrate the efficiency of the proposed algorithm, a model of a three-wheel omnidirectional mobile robot is presented. The paper entitled **Improved FastSLAM2.0 using ANFIS and PSO** by Ramazan Havangi presents an intelligent Rao-Blackwellized particle filter which solves the problem cause by incorrect a priori knowledge about the process and measurement noise covariance matrices. In this method, two adaptive Neuro-Fuzzy inference systems are used for tuning the process and measurement noise covariance matrices and for increasing accuracy and consistency. Also particle swarm optimization is used to optimize the performance of sampling. The paper entitled **Robust Multi-robot Formations via Sliding Mode Controller and Fuzzy Compensator** by Dianwei Qian et al. presents a robust adaptive control scheme which addresses a formation of a multiple-robot system. The control scheme is based on the methodology of sliding mode control, while the formation system is leader-follower-based, whose dynamics are subject to uncertainties. A fuzzy compensator is adopted to approximate the uncertainties. Effectiveness of the presented solution is proven via numerical simulation comparison with the method that does not use the compensator. In the following paper, **Dynamic Distribution of Security Keys and IP Addresses Coalition Protocol for Mobile Ad Hoc Networks** by Shurman et al. an approach is proposed to merge the address assignment with the security key delivery into one protocol, such that a node in the MANET is configured with IP address and security key simultaneously. The proposed method, which is based on T-DAAP, shows significant enhancements in the required control packets needed for assigning network nodes IP addresses and security keys, MAC layer packets, total end-to-end delay, and channel throughput over those obtained when using separate protocols. The paper entitled **Electromagnetic Modeling of Wire-Ground Structures by using a MTL Based Approach** by M. Kechicheb et al. develops a multi-conductor transmission lines-based approach to model electromagnetic coupling of wires above metallic structures. This work is useful in both the nomadic applications (automotive and aeronautic wiring etc.) and the usual electrical applications (home and industrial wiring). The following paper, entitled **Improved Adaptive Transform for Residue**

in H.264/AVC Lossless Video Coding, by Xianfeng Ou et al. presents a new adaptive transform for coding with H.264/AVC based on the character of 4x4 block residual coefficient's distribution, which can be used both in intra and inter coding. The greatest strength of the proposed transform is the decorrelation without inflation versus dynamic range of input matrix. The simulation results show that based on the fast algorithm of the proposed method, the bit saving achieves about 7.41% bit saving in intra coding and 10.47% in inter coding, compared with H.264-LS. Dubravko Miljković in his paper entitled **Active Noise Control in Light Aircraft Cabin Using Multichannel Coherent Method** presents an active noise control system for the cabin of a light aircraft. The paper presents the basic and advanced versions of the system, and after testing single-channel system, achieved noise suppression is verified with additional simulation considering measured acoustic characteristics of real aircraft cabin. In the following paper, **Current Transformers' Saturation Detection and Compensation Based on Instantaneous Flux Density Calculations** by A. Fallahi et al an approach is presented to identify current transformer saturation based on instantaneous flux density calculation. To evaluate efficiency of the proposed algorithm, various types of faults, residual flux, fault occurring angle, CT burdens and DC components have been tested and the results show increase in accuracy and reliability, as well as, faster execution than other compared algorithms. The last paper, entitled **A Lateral Flow Immunochromatographic Assay (LFIA) Strip Reader Based on Scheduler and 8051 IP Core**, by Jian Chong Wei et al. investigates lateral flow immunochromatographic assay (LFIA) testing. This study develops a simple, low cost LFIA strip reader comprising 4 major modules — mechanical, optical, processing and control modules. To reduce the hardware budget and control complexity, a time-triggered cooperative (TTC) scheduler implemented on an 8051 IP core was chosen as control system. The proposed LFIA strip reader has high potential relative to existing readers, especially in simplicity and cost.

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