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Editorial

Optimization in Industrial Systems

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Industrial systems are concerned with the organization and effective utilization of available resources of modern manufacturing and process industries so as to minimize wastes of time, money, materials, and energy. It is thus clear that optimization in industrial systems is crucial for the competitiveness of any industry in a highly competitive economic environment. Consequently, how to utilize advanced modelling and optimization technologies as well as to develop new modelling and optimizations methods to design and manage these systems has attracted the interest of many mathematicians, engineers, and practitioners.

Our intention with this special issue is to provide an opportunity for researchers to facilitate the dissemination of their latest theoretical findings and computational methodologies in modelling, control, and optimization of industrial systems. Thus, we invite authors to submit original research and review papers on novel optimization theory and methodologies as well as their applications in industrial practice. We have received many submissions. All the submitted manuscripts have subjected to rigorous peer-reviewing process and 19 original research articles are finally selected to be published based on reviewers' recommendations. In general, these papers have touched upon research topics in performance evaluation and optimization in supply chain and construction, modelling and optimization in manufacturing, optimal power allocation, and new optimization algorithm developments.

Performance Evaluation and Optimization in Supply Chain and Construction. There are four papers that are related to

supply chain and three papers that are in construction area. Five of them focus on modelling and decision making and the other two on performance evaluation. More specifically, in "*Mathematical model of hybrid precast gravity frames for smart construction and engineering*" the authors proposed an optimized hybrid precast composite structural system for gravity system. In "*Optimal guaranteed service time and service level decision with time and service level sensitive demand*" the authors developed optimization models to determine the optimal retail price, the optimal guaranteed service time, the optimal service level, and the optimal capacity to maximize the expected profit of a two-stage supply chain with one supplier and one retailer. In "*A hybrid fuzzy analytic network process approach to the new product development selection problem*" a hybrid multiple criteria decision model for selecting the most suitable new colour calibration device for a company interested in the medical display monitor market was developed. In "*Development of a carbon emission calculations system for optimizing building plan based on the LCA framework*" the authors proposed a partial framework to assess the carbon emission during the building construction. Several different LCA tools programs have been compared and analysed to demonstrate the limitations of the current application of LCA tools. Then, a new computer calculation system was developed. In "*Closed-loop supply chain network under oligopolistic competition with multiproducts, uncertain demands, and returns*" an equilibrium model of a closed-loop supply chain network with multiproducts, uncertain demands, and returns was studied. Two types of risks, overstocking and understocking, were adopted to simulate the

uncertainty of demands and returns. The scheduling performance evaluation of LSSC was explored and evaluation index system was established in “*Scheduling performance evaluation of logistics service supply chain based on the dynamic index weight.*” In “*Evaluating the performance of absolute RSSI positioning algorithm-based microzoning and RFID in construction materials tracking*” performance of RFID tracking system in construction site was evaluated through field experiments. The experiment results showed that RFID tracking system based on microzoning was reliable for materials tracking in construction site.

Modelling and Optimization in Manufacturing. There are four papers in modelling and optimization in manufacturing. In “*Cellular scanning strategy for selective laser melting: capturing thermal trends with a low-fidelity, pseudo-analytical model*” a low-fidelity pseudo-analytical model was introduced to mimic a finite element model and investigate its thermal trends associated with the process for selective laser melting. In “*Flexible stock allocation and trim loss control for cutting problem in the industrial-use paper production*” an optimization model was built to solve a one-dimensional cutting stock problem in which the stock widths was not used to fulfil the order but kept for use in the future for the industrial-use paper production. The effectiveness of the proposed model was validated through real applications. In “*Feedback-assisted iterative learning model predictive control with nonlinear fuzzy model*”, iterative learning control was combined with model predictive control to develop a feedback-assisted iterative learning controller. Trajectory tracking of a steam-boiler nonlinear system was taken as an example to validate the proposed approach. In “*A plant propagation algorithm for constrained engineering optimization problems*” a new heuristic optimization method “*plant propagation algorithm*” was introduced to solve engineering optimisation problems. Seven benchmark test problems in engineering design were solved by “*plant propagation algorithm*” as well as some existing algorithms to demonstrate the effectiveness and efficiency of the proposed method.

Optimal Power Allocation. There are four papers on optimal power allocation problem. In “*Energy effective congestion control for multicast with network coding in wireless ad hoc network*” the joint optimization of congestion control and power allocation was studied to maximize multicast utility function and minimize energy consumption in wireless ad hoc network. A novel distributed computational scheme was proposed to solve the joint optimization problem based on dual decomposition scheme. In “*Fuzzy multiobjective optimal power flow based on modified artificial bee colony algorithm*” a modified artificial bee colony algorithm was proposed to solve multiobjective optimal power flow problem. In this modified algorithm, the exploitation capacity was improved through replacing the searching operation for new food source in artificial bee colony algorithm with mutation and crossover operation in differential evolution. In “*Multiobjective RFID network optimization using multiobjective evolutionary and swarm intelligence approaches*” RFID network planning was formulated as a multiobjective optimization

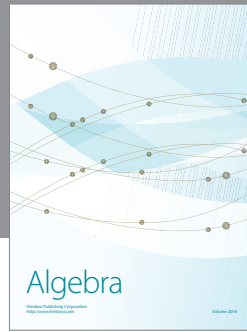
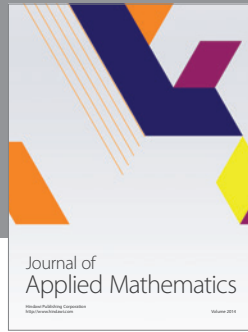
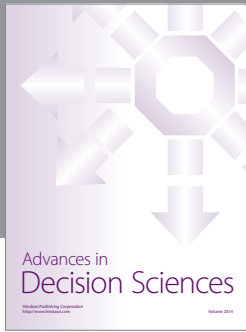
problem. Then, evolutionary algorithm and swarm intelligence were introduced to identify all the Pareto optimal solutions. In “*Optimization of power allocation for multiusers in multi-spot-beam satellite communication systems*” optimizing the power allocation of each user in multispot-beam satellite communication system was formulated as an optimization problem based on the trade-off of the maximization of the total system capacity and the fairness of power allocation amongst users. Comparing with the traditional power allocation algorithms, the proposed algorithm improved the fairness of the power allocation amongst the users.

Advanced Optimization Algorithm Developments. In “*Global minimization for generalized polynomial fractional program*” a novel branch-and-bound method was proposed to solve polynomial fractional optimization problems. Its contribution was that a new strategy, called reduction operations, to cut away the branch based on monotonic optimization was developed. In “*Error bounds and finite termination for constrained optimization problems*” a global error bound for the projected gradient of nonconvex constrained optimization problems and a local error bound for the distance from a feasible solution to the optimal solution set were established based on the definitions of generalized nondegeneration and generalized weak sharp minima. In “*A cross-efficiency based ranking method for finding the most efficient DMU*” a ranking method was developed to rank decision making units and finding the most efficient decision making unit. In “*Game theoretic approaches to weight assignments in data envelopment analysis problems*” fairly allocation amount of divisible goods or burdens among individuals or organizations within multicriteria environment was studied. The problem was modelled and solved under the framework of game theory.

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