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Editorial

Recent Advances on Modeling, Control, and Optimization for Complex Engineering Systems

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The last decade has seen a radical step-change in the scale and complexity of engineering systems, from industries like petrochemical, pharmaceutical, light industry, and machinery manufacturing, to power and energy system and transport, and so forth. Complexity arises from a number of factors, such as the nonlinear coupling among units and variables as well as the uncertainty introduced into the system. Further, the rapid progress of information and communication technologies makes the connections even more complicated and widespread. As the core technologies in dealing with complex systems, the development of new modelling, control, and optimization techniques for large-scale and complex engineering systems have attracted an increasing interest, and it becomes a multidiscipline theme bringing together the modern control theory, computer modelling, intelligent optimization, powerful real-time parallel computing, and networking technology.

The main focus of this special issue is on the new theories and their applications in modeling, control, and optimization for complex engineering systems, especially in industry applications. The topics of these papers cover advanced simulation, modelling, compensation, control, and optimization methods for complex systems and processes; networked control system theory and applications; planning, scheduling, and management; power electronics and power drives; power system operation and control with integration of renewables; electrical machinery and electrical apparatus; smart grid; intelligent transport systems and electric vehicles; wireless networks and sensors; fuzzy and neural systems and networks; metaheuristic algorithms and applications; data fusion and classification; advanced image processing technologies; and intelligent design.

These papers only serve as an introduction to the recent advances in modeling, simulation, control, and optimization for complex engineering systems and applications. It is hoped that this issue will serve as a catalyst for future research aimed at tackling complex engineering problems using advanced techniques.

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