Editorial

Mathematical Approaches in Advanced Control Theories

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Advanced control theory fills a gap between the mathematical control theory and modern control engineering practices. Conceptually, advanced control theories can include any theoretical problems related to the controller design. But in this issue it may include model predictive control, sliding mode control, robust control, real-time optimization, and identification and estimation, which are not limited to controller design. Advanced control technologies have become ubiquitous in various engineering applications (e.g., chemical process control, robot control, air traffic control, vehicle control, multiagent control, networked control). The development of mathematical methods is essential for the applications of advanced control theories. Sometimes, it lacks effective methods to tackle the computational issue (e.g., model predictive control of a fast process). Sometimes, a new application requires a brand-new solver for applying the advanced control theory (e.g., a new production line far exceeding the usual speed). The main focus of this special issue will be on the new research ideas and results for the mathematical problems in advanced control theories.

A total number of 63 papers were submitted for this special issue. Out of the submitted papers, 25 contributions have been included in this special issue. The 25 contributions consider several closely related and interesting topics.