Panagiotis D. Christofides · Jinfeng Liu · David Muñoz de la Peña

Networked and Distributed Predictive Control

Methods and Nonlinear Process Network Applications

Networked and Distributed Predictive Control presents rigorous, yet practical, methods for the design of networked and distributed predictive control systems. The design of model predictive control systems using Lyapunov-based techniques to account for the influence of asynchronous and delayed measurements is followed by a treatment of networked control architecture development. This shows how networked control can augment dedicated control systems in a natural way and takes advantage of additional, potentially asynchronous and delayed measurements to maintain closed loop stability and significantly improve closed-loop performance. The text then shifts focus to the design of distributed predictive control systems that cooperate efficiently in computing optimal manipulated input trajectories that achieve desired stability, performance and robustness specifications but utilize a fraction of the time required by centralized control systems.

Key features of this book include:

- new techniques for networked and distributed control system design;
- insight into issues associated with networked and distributed predictive control problems;
- detailed appraisal of industrial relevance using computer simulation of nonlinear chemical process networks and wind- and solar-energy-generation systems; and
- integrated exposition of novel research topics and rich resource of references to significant recent work.

A full understanding of *Networked and Distributed Predictive Control* requires a basic knowledge of differential equations, linear and nonlinear control theory and optimization methods and the book is intended for academic researchers and graduate students studying control as well as for process control engineers. The constant attention to practical matters associated with implementation of the theory discussed will help researchers and engineers understand the application of the book's methods in greater depth.

Advances in Industrial Control aims to report and encourage the transfer of technology in control engineering. The rapid development of control technology has an impact on all areas of the control discipline. The series offers an opportunity for researchers to present an extended exposition of new work in all aspects of industrial control.

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