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Nota di contenuto	Predictive Control in Process Engineering; Contents; Preface; References; Notation and Abbreviations; 1 Introduction to Predictive Control; 1.1 Preview of Predictive Control; 1.1.1 Prediction of the Reference Value; 1.1.2 Prediction of the Disturbance; 1.2 Manipulated, Reference, and Controlled Signals; 1.3 Cost Function of Predictive Control; 1.4 Reference Signal and Disturbance Preview, Receding Horizon, One-Step-Ahead, and Long-Range Optimal Control; 1.5 Free and Forced Responses of the Predicted Controlled Variable; 1.6 Minimization of the Cost Function 1.6.1 Minimization Algorithms for Nonlinear Processes with or without Constraints 1.6.2 Minimization of the Quadratic Cost Function for Linear Processes without Constraints; 1.7 Simple Tuning Rules of Predictive Control; 1.8 Control of Different Linear SISO Processes; 1.9 Control of Different Linear MIMO Processes; 1.10 Control of Nonlinear Processes; 1.11 Control under Constraints; 1.12 Robustness; 1.13

Summary; References; 2 Linear SISO Model Descriptions; 2.1 Nonparametric System Description; 2.1.1 FIR Model; 2.1.2 FSR Model; 2.1.3 Relationship between the FIRs and the FSRs
2.1.4 Disturbance Model 2.2 Pulse-Transfer Function Model; 2.2.1 Pulse-Transfer Function and Difference Equation; 2.2.2 Relationship between the Pulse-Transfer Function, the Weighting Function, and the Step Response Models; 2.2.3 Disturbance Model; 2.3 Discrete-Time State Space Model; 2.3.1 Minimal-Order State Space Representation; 2.3.2 Non-Minimal-Order State Space Representations; 2.4 Summary; References; 3 Predictive Equations of Linear SISO Models; 3.1 Predictive Equations Based on Nonparametric Models; 3.1.1 Predictive Equations of the Impulse Response Model
3.1.2 Predictive Equations of the Step Response Model 3.2 Predictive Equations Based on the Pulse-Transfer Function; 3.2.1 Repeated Substitution of the Process Model Equation; 3.2.2 Prediction by Solving the Diophantine Equation; 3.2.3 Prediction if the Additive Noise Is Autoregressive; 3.2.4 Prediction in the Presence of a Measurable Disturbance; 3.2.5 Prediction if the Additive Noise Is Nonautoregressive; 3.2.6 Matrix Calculation Method; 3.3 Predictive Equations of the State Space Model; 3.4 Summary; References; 4 Predictive On-Off Control
4.1 Classical On-Off Control by Means of Relay Characteristics 4.2 Predictive Set Point Control; 4.2.1 Cost Function Minimization by a Selection Strategy; 4.2.2 Cost Function Minimization by a Genetic Algorithm; 4.2.3 Simulation and Comparison of the Predictive Set Point Control Algorithms; 4.3 Predictive Start-Up Control at a Reference Signal Change; 4.4 Predictive Gap Control; 4.4.1 Quadratic Cost Function Minimization by the Selection Strategy or the Genetic Algorithm; 4.4.2 Quasi Continuous-Time Optimization; 4.4.3 Minimizing a Limit-Violation-Time-Point-Dependent Cost Function
4.4.4 Online Start-Up Strategy

Sommario/riassunto

Describing the principles and applications of single input, single output and multivariable predictive control in a simple and lively manner, this practical book discusses topics such as the handling of on-off control, nonlinearities and numerical problems. It gives guidelines and methods for reducing the computational demand for real-time applications. With its many examples and several case studies (incl. injection molding machine and waste water treatment) and industrial applications (stripping column, distillation column, furnace) this is invaluable reading for students and engineers who w