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2.3.5.2 Basics of ANNs2.3.5.3 Algorithms for ANN Training; 2.3.5.4 Direct ANN Model-Based NMPC (DANMPC); 2.3.5.5 Stable DANMPC Control Law; 2.3.5.6 Inverse ANN Model-Based NMPC; 2.3.5.7 ANN Model-Based NMPC with Feedback Linearization; 2.3.5.8 ANN Model-Based NMPC with On-Line Linearization; 2.3.6 NMPC Software for Simulation and Practical Implementation; 2.3.6.1 Computational Issues; 2.3.6.2 NMPC Software for Simulation; 2.3.6.3 NMPC Software for Practical Implementation; 2.4 MPC General Tuning Guidelines; 2.4.1 Model Horizon (n); 2.4.2 Prediction Horizon (p); 2.4.3 Control Horizon (m)
2.4.4 Sampling Time (T)2.4.5 Weight Matrices ((/)(y) and (/)(u)); 2.4.6 Feedback Filter; 2.4.7 Dynamic Sensitivity Used for MPC Tuning; 3 Case Studies; 3.1 Productivity Optimization and Nonlinear Model Predictive Control (NMPC) of a PVC Batch Reactor; 3.1.1 Introduction; 3.1.2 Dynamic Model of the PVC Batch Reactor; 3.1.2.1 The Complex Analytical Model of the PVC Reactor; 3.1.2.2 Morphological Model; 3.1.2.3 The Simplified Dynamic Analytical Model of the PVC Reactor; 3.1.3 Productivity Optimization of the PVC Batch Reactor; 3.1.3.1 The Basic Elements of GAs
3.1.3.2 Optimization of the PVC Reactor Productivity through the Initial Concentration of Initiators3.1.3.3 Optimization of PVC Reactor Productivity by obtaining an Optimal Temperature Policy; 3.1.4 NMPC of the PVC Batch Reactor; 3.1.4.1 Multiple On-Line Linearization-Based NMPC of the PVC Batch Reactor; 3.1.4.2 Sequential NMPC of the PVC Batch Reactor; 3.1.5 Conclusions; 3.1.6 Nomenclature; 3.2 Modeling, Simulation, and Control of a Yeast Fermentation Bioreactor; 3.2.1 First Principle Model of the Continuous Fermentation Bioreactor
3.2.2 Linear Model Identification and LMPC of the Bioreactor

Sommario/riassunto

Filling a gap in the literature for a practical approach to the topic, this book is unique in including a whole section of case studies presenting a wide range of applications from polymerization reactors and bioreactors, to distillation column and complex fluid catalytic cracking units. A section of general tuning guidelines of MPC is also present. These thus aid readers in facilitating the implementation of MPC in process engineering and automation. At the same time many theoretical, computational and implementation aspects of model-based control are explained, with a look at both linear and