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Nota di contenuto	Nonlinear Dynamics of Production Systems; Foreword; Preface; List of Contributors; Contents; Part I Dynamics and Control of Production Processes; 1 Dynamical Systems and Production Systems; 1.1 Introduction; 1.2 The Bucket Brigade Production System; 1.2.1 Re-ordering; 1.2.2 Non-constant Speeds; 1.2.3 Bucket Brigades and Learning; 1.3 Fluid Models of Production Networks; 1.4 Dynamics of Supply Chains; 1.4.1 Simulation and Control; Bibliography; 2 Method of Stabilization of a Target Regime in Manufacturing and Logistics; 2.1 Introduction; 2.1.1 Stabilization of a Target Regime (STR Method) 2.1.2 Constraints-based Hierarchy of Models2.1.3 The Algorithm of the Optimal Management of the Systems in Work-sharing Manufacturing; 2.2 The Hierarchy of Models; 2.3 Dynamics of the Models in the Hierarchy; 2.4 Algorithm of Stabilization of the Target Regime for OWS Models; 2.5 Concluding Remarks; Bibliography; 3 Manufacturing Systems with Restricted Buffer Sizes; 3.1 Introduction; 3.2 Hybrid Models; 3.2.1 Switched Arrival and Server Systems; 3.2.2 Limiting Cases; 3.2.3 Dynamics and Bifurcations; 3.2.4 Modified Switching

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3.3 Performance of Manufacturing Systems3.3.1 Evaluation of Cost Functions; 3.3.2 Optimization and Chaos Control; 3.4 Switched Discrete Deterministic Systems; 3.4.1 Dynamics; 3.4.2 Small Stochastic Disturbances; 3.5 Conclusion; Bibliography; 4 Modeling and Analysis of a Re-entrant Manufacturing System; 4.1 Introduction; 4.1.1 Re-entrant Manufacturing Systems and Models; 4.1.2 Control Policies and Their Analysis; 4.2 "Two Products - Two Stages" Re-entrant Manufacturing System; 4.3 Dynamical Model; 4.4 Analysis of Dynamics; 4.4.1 Sensitivity to Initial Conditions
4.4.2 Ergodicity and Stationarity4.4.3 Correlations; 4.5 Dynamical Concept for Manufacturing Control; 4.6 Simulation Model; 4.7 Analysis of Scheduling Policies; 4.8 Conclusion and Outlook; Bibliography; 5 Nonlinear Models for Control of Manufacturing Systems; 5.1 Introduction; 5.2 Extensions to the Standard Fluid Model; 5.2.1 A Common Fluid Model; 5.2.2 An Extension; 5.2.3 An Approximation to the Extended Fluid Model; 5.2.4 A Hybrid Model; 5.3 A New Flow Model; 5.3.1 Introduction to Traffic Flow Theory: the LWR Model; 5.3.2 A Traffic Flow Model for Manufacturing Flow
5.4 The Manufacturing Flow Model Revisited5.5 Concluding Remarks; Bibliography; 6 Modeling and Optimization of Production Processes: Lessons from Traffic Dynamics; 6.1 Modeling the Dynamics of Supply Networks; 6.1.1 Modeling One-dimensional Supply Chains; 6.1.2 "Bull-whip Effect" and Stop-and-Go Traffic; 6.1.3 Dynamical Solution and Resonance Effects; 6.1.4 Discussion of Some Control Strategies; 6.1.5 Production Units in Terms of Queueing Theoretical Quantities; 6.1.6 Calculation of the Cycle Times; 6.1.7 Feeding Rates, Production Speeds and Inventories
6.1.8 Impact of the Supply Network's Topology

Sommario/riassunto

This reference work provides a comprehensive insight into past developments in the application of non-linear dynamics, such as production systems in the manufacturing and process engineering, mechanical engineering and plant construction and automation technology. As such, it is the first publication to document the successful implementation of non-linear dynamics into current tasks or problems of engineering thus far unsolved. The interdisciplinary team of contributors from research and industry establishes ties between mechanical methods of manufacturing and new methods reaching the dynamics