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Nota di contenuto	Cyber-Physical Systems Design -- Flow analysis and its applications for equipment design -- Cyber-physical control system of hardware-software complex of anthropomorphous robot: Architecture and models -- Method of the exoskeleton assembly synthesis on the base of anthropometric characteristics analysis -- Using special text points in the recognition of documents -- Software for extraction of Cyber-Physical system inventions' structural elements from Russian patents -- Conceptual Approach to Designing Efficient Cyber-Physical Systems in The Presence of Uncertainty -- About preparation of the analytical platform for creation of a cyber-physical system of industrial mixture of loose components -- Development of an automated system for monitoring and diagnostics a guided robotic vehicle -- About formation of elements of a cyber-physical system for efficient throttling of fluid in an axial valve -- A Study of a trajectory synthesis method for a cyclic changeable target in an environment with periodic dynamics of properties -- Cyber-Physical Systems Modeling -- Intellectualization methods of population algorithms of global optimization -- Development of models and algorithms for intellectual support of life cycle of chemical production equipment -- Simulation of the Multialternativity Attribute in the Processes of Adaptive Evolution --

Regularization Methods for the Stable Identification of Probabilistic Characteristics of Stochastic Structures -- Outlier Detection in Predictive Analytics for Energy Equipment -- Ontology-based model of user activity data for cyber-physical systems -- Selection of components of a composite material under fuzzy information conditions -- Big Data Analysis in Film Production -- Algorithm for calculating the reliability of chemical-engineering systems using the logical-and-probabilistic method in MATLAB -- Cyber-Physical Systems And Digital Twins -- Assessment of the State of Production System Components for Digital Twins Technology -- Proactive and predictive maintenance of cyber-physical systems -- Conceptual Approach to Building a Digital Twin of the Production System -- Deep Neural Networks application in models with complex technological objects -- Intelligent Technologies in the Diagnostics using Object's Visual Images -- Modeling cyber-physical system object in state space (on the example of paver) -- Accelerometer Data-Based Cyber-Physical System For Training Intensity Estimation -- Assembly and service robotic space module. Mathematical model of the reduced system.

Sommario/riassunto

This book presents new findings on cyber-physical systems design and modelling approaches based on AI and data-driven techniques, identifying the key industrial challenges and the main features of design and modelling processes. To enhance the efficiency of the design process, it proposes new approaches based on the concept of digital twins. Further, it substantiates the scientific, practical, and methodological approaches to modelling and simulating of cyber-physical systems. Exploring digital twins of cyber-physical systems as well as of production systems, it proposes combining both mathematical models and data processing techniques as advanced methods for cyber-physical system design and modelling. Moreover, it presents the implementation of the developed prototypes, including testing in real industries, which have collected and analyzed big data and proved their effectiveness. The book is intended for practitioners, enterprise representatives, scientists, and Ph.D. and master's students interested in the research and applications of cyber-physical systems in different domains.