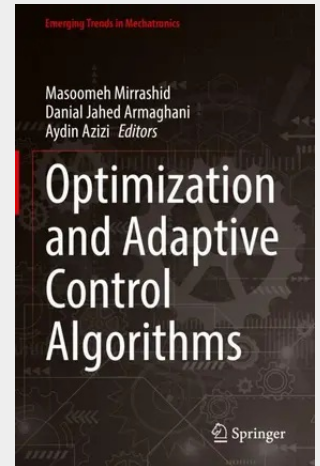


Optimization and Adaptive Control Algorithms

This book presents smart optimization techniques and adaptive intelligent control systems which stimulate innovations in engineering and computational science. This book captures these innovations and describes multiple applications of various advanced algorithms. The book encompasses a diverse range of applications and illustrates the value of these computational techniques; notable applications include the attitude control of CubeSats, the performance of building components during seismic events, the efficiency of tunnel-boring machines, and forecasting of environmental and structural phenomena. A major theme presented within the book is the development of advanced intelligent systems, including self-optimizing modules, as reflected in research advances on Digital Twins and Omniverse technologies, where real-time supervision and control are achieved through virtual replicas of physical entities and spatial environments. The incorporation of artificial intelligence (AI) provides essential simplifications of otherwise opaque models, yielding interpretable insights that facilitate process automation. By connecting rigorous theoretical work with real-world problems, the book serves as a guide for researchers, engineers, and students, which offers a comprehensive picture of advanced developments in the area of adaptive optimized systems, alongside the theory and practice necessary to innovate within systems engineering.

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