

## Model-Based Tracking Control of Nonlinear Systems (Modern Mechanics and Mathematics)

Elzbieta Jarzebowska



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**Model-Based Control of Nonlinear Systems** presents model-based control techniques for nonlinear, constrained systems. It covers constructive control design methods with an emphasis on modeling constrained systems, generating dynamic control models, and designing tracking control algorithms for the models.

The book's interdisciplinary approach illustrates how system modeling and control theory are essential to control design projects. Organized according to the steps in a control design project, the text first discusses kinematic and dynamic modeling methods, including programmed constraints, Lagrange's equations, Boltzmann–Hamel equations, and generalized programmed motion equations. The next chapter describes basic control concepts and the use of nonlinear control theory. After exploring stabilization strategies for nonlinear systems, the author presents existing model-based tracking control algorithms and path-following strategies for nonlinear systems. The final chapter develops a new model reference tracking strategy for programmed motion.

Throughout the text, two examples of mechanical systems are used to illustrate the theory and simulation results. The first example is a unicycle model (nonholonomic system) and the second is a two-link planar manipulator model (holonomic system). With a focus on constructive modeling and control methods, this book provides the tools and techniques to support the control design process.

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