



Modeling and Analysis of Dynamic Systems

By Ramin S. Esfandiari, Bei Lu



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Using MATLAB® and Simulink® to perform symbolic, graphical, numerical, and simulation tasks, **Modeling and Analysis of Dynamic Systems** provides a thorough understanding of the mathematical modeling and analysis of dynamic systems. It meticulously covers techniques for modeling dynamic systems, methods of response analysis, and vibration and control systems.

After introducing the software and essential mathematical background, the text discusses linearization and different forms of system model representation, such as state-space form and input-output equation. It then explores translational, rotational, mixed mechanical, electrical, electromechanical, pneumatic, liquid-level, and thermal systems. The authors also analyze the time and frequency domains of dynamic systems and describe free and forced vibrations of single and multiple degree-of-freedom systems, vibration suppression, modal analysis, and vibration testing. The final chapter examines aspects of control system analysis, including stability analysis, types of control, root locus analysis, Bode plot, and full-state feedback.

With much of the material rigorously classroom tested, this textbook enables undergraduate students to acquire a solid comprehension of the subject. It provides at least one example of each topic, along with multiple worked-out examples for more complex topics. The text also includes many exercises in each chapter to help students learn firsthand how a combination of ideas can be used to analyze a problem.

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About the Author

Ramin Esfandiari is a professor of mechanical and aerospace engineering at California State University, Long Beach.

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