Dynamic Modeling and Control of Engineering Systems

By Bohdan T. Kulakowski, John F. Gardner, J. Lowen Shearer

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This textbook is ideal for an undergraduate course in Engineering System Dynamics and Controls. It is intended to provide the reader with a thorough understanding of the process of creating mathematical (and computer-based) models of physical systems. The material is restricted to lumped parameter models, which are those models in which time is the only independent variable. It assumes a basic knowledge of engineering mechanics and ordinary differential equations. The new edition has expanded topical coverage and many more new examples and exercises.

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Editorial Review

From the Publisher
This book is a comprehensive treatment of the analysis of lumped parameter physical systems. The first portion of the book deals with the fundamentals of dynamics system modeling including a discussion of mechanical systems (translational and rotational), analytical solutions of ordinary differential equations and a discussion of state space theory. A greatly expanded treatment of numerical methods and techniques for computer simulation is also included. The nest portion of the text deals with modeling systems from various physical domains (electrical, fluid, and thermal) and systems which combine many physical domains. The book concludes with an introduction to the concepts and theory pertinent to automatic control systems, including computer control systems.

From the Back Cover
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About the Author
Bohdan Kulakowski, PhD (1943-2006) was Professor of Mechanical Engineering in the Department of Mechanical and Nuclear Engineering at Pennsylvania State University. Kulakowski was an internationally recognized expert in automatic control systems, computer simulations and control of industrial processes, system dynamics, vehicle/road dynamic interaction and transportation systems. His fuzzy logic algorithm for avoiding skidding accidents was recognized in 2000 by Discover magazine as one of its top 10 technological innovations of the year.

John Gardner is the Chair of the Mechanical and Biomedical Engineering Department at Boise State University where he has been a faculty member since 2000. Prior to his appointment at Boise State, Dr Gardner was on the faculty at Pennsylvania State University in University Park where his research in dynamic systems and controls led to publications in diverse fields from railroad freight car dynamics to adaptive control of artificial hearts. He pursues research in modeling and control of engineering and biological systems.

J. Lowen Shearer (1921-92) received his ScD from Massachusetts Institute of Technology. At MIT between 1950 and 1963, he served as both the group leader in the Dynamic Analysis and Control Laboratory and as a member of the Mechanical Engineering faculty. From 1963 until his retirement in 1985, he served on the faculty of Mechanical Engineering at Pennsylvania State University. Professor Shearer was a long-time member of ASME's Dynamic Systems and Control Division and received that Group's Rufus Oldenberger Award in 1983. In addition, he was the recipient of the Donald P. Eckman Award (ISA, 1965) and the

Richard Memorial Award (ASEM, 1966).

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