

$$\dot{x}_1 = f(x_1, x_2, x_5)$$

x_2 In recent years, there has been an explosion of interest in network-based modeling in many branches of science. This book synthesizes some of the common features of many such models, providing a general framework analogous to the modern theory of nonlinear dynamical systems. How networks lead to behavior not typical in a general dynamical system and how the architecture and symmetry of the network influence this behavior are the book's main themes.

x_2 *Dynamics and Bifurcation in Networks: Theory and Applications of Coupled Differential Equations* is the first book to describe the formalism for network dynamics developed over the past 20 years. In it, the authors

- x_3 • introduce a definition of a network and the associated class of "admissible" ordinary differential equations, in terms of a directed graph whose nodes represent component dynamical systems and whose arrows represent couplings between these systems;
- x_3 • develop connections between network architecture and the typical dynamics and bifurcations of these equations; and
- x_3 • discuss applications of this formalism to various areas of science, including gene regulatory networks, animal locomotion, decision-making, homeostasis, binocular rivalry, and visual illusions.

x_4 This book will be of interest to scientific researchers in any area that uses network models, which includes many parts of biology, physics, chemistry, computer science, electrical and electronic engineering, psychology, and sociology.



Martin Golubitsky is on the Emeritus Faculty of The Ohio State University where he served as Distinguished Professor of Mathematical and Physical Sciences. He is author or co-author of more than 150 publications on Lie algebras, singularity theory, bifurcation theory, pattern formation, chaos, network dynamics, and applications, and he has co-authored six books on these topics. Professor Golubitsky is a Fellow of the American Academy of Arts and Sciences, AAAS, SIAM, and AMS. He was chair of the SIAM Activity Group on Dynamical Systems and of the AAAS Section A. He was director of the Mathematical Biosciences Institute, founding editor-in-chief of *SIAM Journal on Applied Dynamical Systems*, and president of SIAM. He has delivered more than 500 invited lectures. His awards include the UH Farfel Award, the SIAM Moser Lecture Prize, and the Rothschild Professorship and Lecture at the University of Cambridge.



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