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Sommario/riassunto

A practical approach to obtaining nonlinear dynamic models from stimulus-response dataNonlinear modeling of physiological systems from stimulus-response data is a long-standing problem that has substantial implications for many scientific fields and associated technologies. These disciplines include biomedical engineering, signal processing, neural networks, medical imaging, and robotics and automation. Addressing the needs of a broad spectrum of scientific and engineering researchers, this book presents practicable, yet mathematically rigorous methodologies for constructing dynamic models of physiological systems.Nonlinear Dynamic Modeling of Physiological Systems provides the most comprehensive treatment of the subject to date. Starting with the mathematical background upon which these methodologies are built, the book presents the methodologies that have been developed and used over the past thirty years. The text discusses implementation and computational issues and gives illustrative examples using both synthetic and experimental data. The author discusses the various modeling approaches-nonparametric, including the Volterra and Wiener models; parametric; modular; and connectionist-and clearly identifies their comparative advantages and disadvantages along with the key criteria that must guide successful practical application. Selected applications covered include neural and sensory systems, cardiovascular and renal systems, and endocrine and metabolic systems. This lucid and comprehensive text is a valuable reference and guide for the community of scientists and engineers who wish to develop and apply the skills of nonlinear modeling to physiological systems.

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