



# Identification of Physical Systems: Applications to Condition Monitoring, Fault Diagnosis, Soft Sensor and Controller Design

*Rajamani Doraiswami, Maryhelen Stevenson, Chris Diduch*

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Identification of a physical system deals with the problem of identifying its mathematical model using the measured input and output data. As the physical system is generally complex, nonlinear, and its input output data is corrupted noise, there are fundamental theoretical and practical issues that need to be considered. Identification of Physical Systems addresses this need, presenting a systematic, unified approach to the problem of physical system identification and its practical applications. Starting with a least-squares method, the authors develop various schemes to address the issues of accuracy, variation in the operating regimes, closed loop, and interconnected subsystems. Also presented is a non-parametric signal or data-based scheme to identify a means to provide a quick macroscopic picture of the system to complement the precise microscopic picture given by the parametric model-based scheme. Finally, a sequential integration of totally different schemes, such as non-parametric, Kalman filter, and parametric model, is developed to meet the speed and accuracy requirement of mission-critical systems. Key features: \* Provides a clear understanding of theoretical and practical issues in identification and its applications, enabling the reader to grasp a clear understanding of the theory and apply it to practical problems \* Offers a self-contained guide by including the background necessary to understand this interdisciplinary subject \* Includes case studies for the application of identification on physical laboratory scale systems, as well as number of illustrative examples throughout the book Identification of Physical Systems is a comprehensive reference for researchers and practitioners working in this field and is also a useful source of information for graduate students in electrical, computer, biomedical, chemical, and mechanical engineering.

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