Computation

an Open Access Journal by MDPI

CiteScore: 5.2
Impact Factor: 2.6

Special Issue Reprint

Nonlinear System Modelling and Control

Edited by: Chathura Wanigasekara

Modelling of nonlinear systems and control is a vital field in engineering and mathematics, aiming to understand, model, and manipulate systems exhibiting nonlinear behaviour. Unlike linear systems, where outputs are directly proportional to inputs, nonlinear systems feature more complex dynamics, making them ubiquitous in real-world applications such as robotics, aerospace, energy applications, bioengineering, economics, and many more. The process of system modelling/identification involves constructing mathematical models based on observed data. For nonlinear systems, this typically entails capturing the system's input–output relationships and internal dynamics, which can exhibit characteristics such as saturation, hysteresis, and multi-stability. Techniques employed include nonlinear regression, neural networks, and differential equation modelling, often requiring advanced algorithms and significant computational resources. Once a nonlinear system is accurately identified, control strategies can be developed to achieve desired behaviours. Nonlinear control methods, such as feedback linearization, sliding mode control, and adaptive control, are designed to handle the intricacies of nonlinear dynamics, ensuring stability, performance, and robustness. In summary, modelling and control of nonlinear systems are essential for developing sophisticated technologies and enhancing system performance in complex environments, reflecting a crucial intersection of theoretical research and practical application.

https://www.mdpi.com/books/reprint/12972