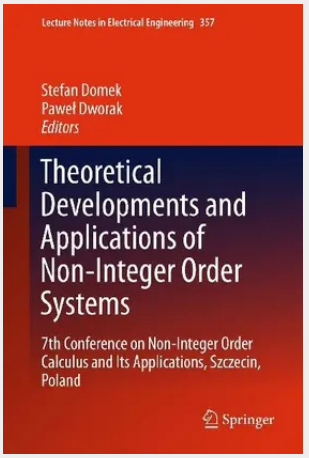
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Theoretical Developments and Applications of Non-Integer Order Systems

7th Conference on Non-Integer Order Calculus and Its Applications, Szczecin, Poland



This volume is devoted to presentation of new results of research on systems of non-integer order, called also fractional systems. Their analysis and practical implementation have been the object of spontaneous development for a few last decades. The fractional order models can depict a physical plant better than the classical integer order ones. This covers different research fields such as insulator properties, visco-elastic materials, electrodynamic, electrothermal, electrochemical, economic processes modelling etc. On the other hand fractional controllers often outperform their integer order counterparts. This volume contains new ideas and examples of implementation, theoretical and pure practical aspects of using a non-integer order calculus. It is divided into four parts covering: mathematical fundamentals, modeling and approximations, controllability, observability and stability problems and practical applications of fractional control systems. The first part expands the base of tools and methods of the mathematical basis for non-integer order calculus. Part two focuses on new methods and developments in process modeling and fractional derivatives approximations. In the third part a bunch of papers which raise problems of controllability, observability and stability of non-integer order systems is provided. Part four is devoted to presentation of different fractional order control applications. This book was created thanks to many experts in the field of fractionalcalculus: authors, anonymous referees whose comments allowed us to improve the final form of the papers and active and inspiring discussion of the participants of RRNR'2015, the 7th Conference on Non-Integer Order Calculus and Its Applications that was organized by the Faculty of Electrical Engineering, West Pomeranian University of Technology, Szczecin, Poland.

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