

1. Record Nr.	UNINA9911031568803321
Autore	Eidinejad Zahra
Titolo	Optimal Stability Theory and Approximate Solutions of Fractional Systems : New Results on the Analysis of Fractional Equations: Theoretical Insights and Numerical Approximations // by Zahra Eidinejad, Reza Saadati, Tofigh Allahviranloo, Chenkuan Li, Javad Vahidi
Pubbl/distr/stampa	Cham : , : Springer Nature Switzerland : , : Imprint : Springer, , 2025
ISBN	3-031-96704-6
Edizione	[1st ed. 2025.]
Descrizione fisica	1 online resource (598 pages)
Collana	Studies in Systems, Decision and Control, , 2198-4190 ; ; 606
Altri autori (Persone)	SaadatiReza AllahviranlooTofigh LiChenkuan VahidiJavad
Disciplina	620
Soggetti	Engineering mathematics Engineering - Data processing Dynamics Nonlinear theories Computational intelligence Mathematical and Computational Engineering Applications Applied Dynamical Systems Computational Intelligence Matemàtica per a enginyers Dinàmica Intel·ligència computacional Teories no lineals Llibres electrònics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Basic concepts Review -- Analysis of a new stability -- Analysis of a new stability on matrix valued fuzzy spaces -- Picard method -- Cellular neural networks, pseudo almost automorphic solution -- Z Numbers -- Analysis of numerical methods.

This comprehensive book is designed for undergraduate, master's, and doctoral students in mathematics, as well as scholars interested in a deep understanding of fractional problems. The book covers a wide range of topics, including the existence and uniqueness of solutions, stability, optimal controllers, special functions, classical and fuzzy normed spaces, matrix functions, fuzzy matrix normed spaces, fixed-point theory, quality and certainty, and various numerical methods. The primary objective of this book is to analyze the existence and uniqueness of solutions for functional equations, analyze stability, and achieve the best possible results with minimal error. With a clear and direct approach, it presents advanced concepts in an accessible and comprehensible manner, enabling students to apply their knowledge to solving various problems. To prevent instability in fractional systems, methods based on fixed-point theory with the best approximation have been utilized. The stability analysis of fractional equations is conducted by considering classical and fuzzy normed spaces and employing special functions as optimal controllers. In fuzzy systems, the Z-number theory has been used to enhance results and improve quality. This theory enables the assessment of approximation accuracy and quality, providing the best possible approximation. The numerical analysis of fractional systems plays a crucial role in accurately modeling physical phenomena, simulations, and predicting complex systems. By presenting numerical results from fractional systems, which are essential in solving real-world problems and optimizing computational algorithms, this book serves as a valuable resource for both researchers and students.
