1.	Record Nr.	UNINA9910483547903321
Autore	Gal Ciprian G.
Titolo	Fractional-in-time semilinear parabolic equations and applications / / Ciprian G. Gal, Mahamadi Warma
Pubbl/distr/stampa	Cham, Switzerland : , : Springer, , [2020] ©2020
ISBN	3-030-45043-0
Edizione	[1st ed. 2020.]
Descrizione fisica	1 online resource (XII, 184 p. 103 illus.)
Collana	Mathematiques & Applications ; ; 84
Disciplina	515.353
Soggetti	Differential equations, Partial Engineering mathematics Applied mathematics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	1. Introduction.-1.1 Historical remarks .-1.2 On overview of main results and applications .-1.3 Results on nonlocal reaction-diffusion systems 2. The functional framework.-2.1 The fractional-in-time linear Cauchy problem .-2.2 Ultracontractivity and resolvent families .-2.3 Examples of sectorial operators .-3 The semilinear parabolic problem. -3.1 Maximal mild solution theory .-3.2 Maximal strong solution theory .-3.3 Differentiability properties in the case $0 < a <$.-3.4 Global a priori estimates -- 3.5 Limiting behavior as a ®1 -- 3.6 Nonnegativity of mild solutions .-3.7 An application: the fractional Fisher-KPP equation .-4 Systems of fractional kinetic equations .-4.1 Nonlinear fractional reaction-diffusion .-4.2 The fractional Volterra-Lotka model .-4.3 A fractional nuclear reactor model .-5 Final remarks and open problems .-A Some supporting technical tools .-B Integration by parts formula for the regional fractional Laplacian .-C A zoo of fractional kinetic equations.-C.1 Fractional equation with nonlocality in space.-C.2 Fractional equation with nonlocality in time.-C.3 Space-time fractional nonlocal equation.-References.-Index.
Sommario/riassunto	This book provides a unified analysis and scheme for the existence and uniqueness of strong and mild solutions to certain fractional kinetic equations. This class of equations is characterized by the presence of a

nonlinear time-dependent source, generally of arbitrary growth in the unknown function, a time derivative in the sense of Caputo and the presence of a large class of diffusion operators. The global regularity problem is then treated separately and the analysis is extended to some systems of fractional kinetic equations, including prey-predator models of Volterra–Lotka type and chemical reactions models, all of them possibly containing some fractional kinetics. Besides classical examples involving the Laplace operator, subject to standard (namely, Dirichlet, Neumann, Robin, dynamic/Wentzell and Steklov) boundary conditions, the framework also includes non-standard diffusion operators of "fractional" type, subject to appropriate boundary conditions. This book is aimed at graduate students and researchers in mathematics, physics, mathematical engineering and mathematical biology whose research involves partial differential equations. .