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Autore	Kubica Adam
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Nota di contenuto	Chapter 1: Basics on fractional differentiation and integration -- Chapter 2: Definition of fractional derivatives in Sobolev spaces and properties -- Chapter 3: Fractional ordinary differential equations -- Chapter 4: Initial boundary value problems for time-fractional diffusion equations -- Chapter 5: Decay rate as t -- Chapter 6: Concluding remarks on future works.
Sommario/riassunto	This book aims to establish a foundation for fractional derivatives and fractional differential equations. The theory of fractional derivatives enables considering any positive order of differentiation. The history of research in this field is very long, with its origins dating back to Leibniz. Since then, many great mathematicians, such as Abel, have made contributions that cover not only theoretical aspects but also physical applications of fractional calculus. The fractional partial differential equations govern phenomena depending both on spatial and time variables and require more subtle treatments. Moreover, fractional partial differential equations are highly demanded model equations for solving real-world problems such as the anomalous diffusion in heterogeneous media. The studies of fractional partial differential equations have continued to expand explosively. However we observe that available mathematical theory for fractional partial

differential equations is not still complete. In particular, operator-theoretical approaches are indispensable for some generalized categories of solutions such as weak solutions, but feasible operator-theoretic foundations for wide applications are not available in monographs. To make this monograph more readable, we are restricting it to a few fundamental types of time-fractional partial differential equations, forgoing many other important and exciting topics such as stability for nonlinear problems. However, we believe that this book works well as an introduction to mathematical research in such vast fields. The fractional partial differential equations govern phenomena depending both on spatial and time variables require more subtle treatments. Moreover, they are highly demanded model for solving real-world problems such as the anomalous diffusion in heterogeneous media.
