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Titolo	Theory of reproducing kernels and applications / / by Saburou Saitoh, Yoshihiro Sawano
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Descrizione fisica	1 online resource (464 p.)
Collana	Developments in Mathematics, , 1389-2177 ; ; 44
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Soggetti	Functional analysis Fourier analysis Functions of complex variables Differential equations, Partial Functional Analysis Fourier Analysis Functions of a Complex Variable Partial Differential Equations
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
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Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Definitions and examples of reproducing kernel Hilbert spaces -- Fundamental properties of RKHS -- Moore Penrose generalized inverses and Tikhonov regularization -- Real inversion formulas of the Laplace transform -- Applications to ordinary differential equations -- Applications to partial differential equations -- Applications to integral equations -- Special topics on reproducing kernels -- Appendices -- Index.
Sommario/riassunto	This book provides a large extension of the general theory of reproducing kernels published by N. Aronszajn in 1950, with many concrete applications. In Chapter 1, many concrete reproducing kernels are first introduced with detailed information. Chapter 2 presents a general and global theory of reproducing kernels with basic applications in a self-contained way. Many fundamental operations among reproducing kernel Hilbert spaces are dealt with. Chapter 2 is the heart of this book. Chapter 3 is devoted to the Tikhonov regularization using the theory of reproducing kernels with applications

to numerical and practical solutions of bounded linear operator equations. In Chapter 4, the numerical real inversion formulas of the Laplace transform are presented by applying the Tikhonov regularization, where the reproducing kernels play a key role in the results. Chapter 5 deals with ordinary differential equations; Chapter 6 includes many concrete results for various fundamental partial differential equations. In Chapter 7, typical integral equations are presented with discretization methods. These chapters are applications of the general theories of Chapter 3 with the purpose of practical and numerical constructions of the solutions. In Chapter 8, hot topics on reproducing kernels are presented; namely, norm inequalities, convolution inequalities, inversion of an arbitrary matrix, representations of inverse mappings, identifications of nonlinear systems, sampling theory, statistical learning theory and membership problems. Relationships among eigen-functions, initial value problems for linear partial differential equations, and reproducing kernels are also presented. Further, new fundamental results on generalized reproducing kernels, generalized delta functions, generalized reproducing kernel Hilbert spaces, and as well, a general integral transform theory are introduced. In three Appendices, the deep theory of Akira Yamada discussing the equality problems in nonlinear norm inequalities, Yamada's unified and generalized inequalities for Opial's inequalities and the concrete and explicit integral representation of the implicit functions are presented.

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