1. Record Nr. UNISA996418252003316

Autore	McGhee Des
Titolo	A Primer for a Secret Shortcut to PDEs of Mathematical Physics [[electronic resource] /] / by Des McGhee, Rainer Picard, Sascha Trostorff, Marcus Waurick
Pubbl/distr/stampa	Cham : , : Springer International Publishing : , : Imprint : Birkhäuser, , 2020
ISBN	3-030-47333-3
Edizione	[1st ed. 2020.]
Descrizione fisica	1 online resource (191 pages)
Collana	Frontiers in Mathematics, , 1660-8046
Disciplina	515.353
Soggetti	Partial differential equations Partial Differential Equations
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Introduction -- The Solution Theory for a Basic Class of Evolutionary Equations -- Some Applications to Models from Physics and Engineering -- But what about the Main Stream? -- Two Supplements for the Toolbox -- Requisites from Functional Analysis.
Sommario/riassunto	This book presents a concise introduction to a unified Hilbert space approach to the mathematical modelling of physical phenomena which has been developed over recent years by Picard and his co-workers. The main focus is on time-dependent partial differential equations with a particular structure in the Hilbert space setting that ensures well-posedness and causality, two essential properties of any reasonable model in mathematical physics or engineering. As a unique feature, this powerful tool for tackling time-dependent partial differential equations is subsequently applied to many equations. By means of illustrative examples, from the straightforward to the more complex, the authors show that many of the classical models in mathematical physics as well as more recent models of novel materials and interactions are covered, or can be restructured to be covered, by this unified Hilbert space approach. The reader should require only a basic foundation in the theory of Hilbert spaces and operators therein. For convenience, however, some of the more technical background requirements are covered in detail in the appendix. The theory is kept as elementary as

possible, making the material suitable for a senior undergraduate or master's level course. In addition, researchers in a variety of fields whose work involves partial differential equations and applied operator theory will also greatly benefit from this approach to structuring their mathematical models in order that the general theory can be applied to ensure the essential properties of well-posedness and causality.