| | | |
|---|---|---|
| 1. | Record Nr. | UNINA9910906200903321 |
| | Autore | Griebel Michael |
| | Titolo | Hilbert Space Splittings and Iterative Methods / / by Michael Griebel, Peter Oswald |
| | Pubbl/distr/stampa | Cham : , : Springer Nature Switzerland : , : Imprint : Springer, , 2024 |
| | ISBN | 9783031743702 |
| | | 3031743709 |
| | Edizione | [1st ed. 2024.] |
| | Descrizione fisica | 1 online resource (444 pages) |
| | Collana | Springer Series in Computational Mathematics, , 2198-3712 ; ; 62 |
| | Altri autori (Persone) | OswaldPeter |
| | Disciplina | 518 |
| | Soggetti | Mathematics - Data processing |
| | | Espais de Hilbert |
| | | Mètodes iteratius (Matemàtica) |
| | | Computational Mathematics and Numerical Analysis |
| | | Llibres electrònics |
| | Lingua di pubblicazione | Inglese |
| | Formato | Materiale a stampa |
| | Livello bibliografico | Monografia |
| | Nota di contenuto | 1 Introduction -- 2 Hilbert space splittings: Abstract theory -- References -- 3 Hilbert space splittings: Examples and extensions -- References -- 4 Schwarz iterative methods: Finite Omega -- References -- 5 Special topics and extensions -- References -- 6 Schwarz approximation methods: Infinite Omega -- References -- 7 Applications to PDE solvers -- References -- A Hilbert space basics -- A.1 Spaces: Basic notation, definitions and properties -- A.2 Operators between Hilbert spaces -- A.3 Linear equations and variational problems -- A.4 Constructions on Hilbert spaces -- A.5 Sobolev spaces on domains -- A.6 Reproducing kernel Hilbert spaces (RKHS) -- References -- Index. |
| | Sommario/riassunto | This book is about the theory of so-called Schwarz methods for solving variational problems in a Hilbert space V arising from linear equations and their associated quadratic minimization problems. Schwarz methods are based on the construction of a sequence of approximate solutions by solving auxiliary variational problems on a set of (smaller, finite-dimensional) Hilbert spaces Vi in a certain order, combining them, and using the combined approximations in an iterative |

procedure. The spaces Vi form a so-called space splitting for V, they need not necessarily be subspaces of V, and their number can be finite or infinite. The convergence behavior of Schwarz methods is influenced by certain properties of the space splittings they are based on. These properties are identified, and a detailed treatment of traditional deterministic and more recent greedy and stochastic orderings in the subproblem solution process is given, together with an investigation of accelerated methods. To illustrate the abstract theory, the numerical linear algebra analogs of the iterative methods covered in the book are discussed. Its standard application to the convergence theory of multilevel and domain decomposition methods for solving PDE problems is explained, and links to optimization theory and online learning algorithms are given. Providing an introduction and overview of iterative methods which are based on problem decompositions and suitable for parallel and distributed computing, the book could serve as the basis for a one- or two-semester course for M.S. and Ph.D. students specializing in numerical analysis and scientific computing. It will also appeal to a wide range of researchers interested in scientific computing in the broadest sense.