

|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Record Nr.           | UNISA996466545403316                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Autore                  | Noe Angelo Caruso                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Titolo                  | Inverse linear problems on a Hilbert space and their Krylov solvability /<br>/ Noe Angelo Caruso, Alessandro Michelangeli                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Pubbl/distr/stampa      | Cham, Switzerland : , : Springer, , [2021]<br>©2021                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| ISBN                    | 3-030-88159-8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Descrizione fisica      | 1 online resource (150 pages)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Collana                 | Springer Monographs in Mathematics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Disciplina              | 515.357                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Soggetti                | Hilbert space<br>Problemes inversos (Equacions diferencials)<br>Espais de Hilbert<br>Operadors lineals<br>Llibres electrònics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Lingua di pubblicazione | Inglese                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Formato                 | Materiale a stampa                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Livello bibliografico   | Monografia                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Nota di bibliografia    | Includes bibliographical references and index.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Nota di contenuto       | Intro -- Preface -- Contents -- Acronyms -- Chapter 1 Introduction and motivation -- 1.1 Abstract inverse linear problems on Hilbert space -- 1.2 General truncation and approximation scheme -- 1.3 Krylov subspace and Krylov solvability -- 1.4 Structure of the book -- Chapter 2 Krylov solvability of bounded linear inverse problems -- 2.1 Krylov subspace of a Hilbert space -- 2.2 Krylov reducibility and Krylov intersection -- 2.3 Krylov solutions for a bounded linear inverse problem -- 2.3.1 Krylov solvability. Examples. -- 2.3.2 General conditions for Krylov solvability: case of injectivity -- 2.3.3 Krylov reducibility and Krylov solvability -- 2.3.4 More on Krylov solutions in the lack of injectivity -- 2.4 Krylov solvability and self-adjointness -- 2.5 Special classes of Krylov solvable problems -- 2.6 Some illustrative numerical tests -- Chapter 3 An analysis of conjugate-gradient based methods with unbounded operators -- 3.1 Unbounded positive self-adjoint inverse problems and conjugate gradient approach -- 3.2 Set-up and main results -- 3.3 Algebraic and measure-theoretic background properties -- 3.4 Proof of CG-convergence and additional observations -- 3.5 Unbounded CG-convergence tested numerically -- |

Chapter 4 Krylov solvability of unbounded inverse problems -- 4.1 Unbounded setting -- 4.2 The general self-adjoint and skew-adjoint case -- 4.3 New phenomena in the general unbounded case: 'Krylov escape', generalised Krylov reducibility, generalised Krylov intersection -- 4.4 Krylov solvability in the general unbounded case -- 4.5 The self-adjoint case revisited: structural properties. -- 4.6 Remarks on rational Krylov subspaces and solvability of self-adjoint inverse problems -- Chapter 5 Krylov solvability in a perturbative framework -- 5.1 Krylov solvability from a perturbative perspective -- 5.2 Fundamental perturbative questions. 5.3 Gain or loss of Krylov solvability under perturbations -- 5.3.1 Operator perturbations -- 5.3.2 Data perturbations -- 5.3.3 Simultaneous perturbations of operator and data -- 5.4 Krylov solvability along perturbations of  $K$ -class -- 5.5 Weak gap-metric for weakly closed parts of the unit ball -- 5.6 Weak gap metric for linear subspaces -- 5.7 Krylov perturbations in the weak gap-metric -- 5.7.1 Some technical features of the vicinity of Krylov subspaces -- 5.7.2 Existence of  $d_w$ -limits. Krylov inner approximability. -- 5.7.3 Krylov solvability along  $d_w$ -limits -- 5.8 Perspectives on the perturbation framework -- Appendix A Outlook on general projection methods and weaker convergence -- A.1 Standard projection methods and beyond -- A.2 Finite-dimensional truncation -- A.2.1 Set up and notation -- A.2.2 Singularity of the truncated problem -- A.2.3 Convergence of the truncated problems -- A.3 The compact linear inverse problem -- A.4 The bounded linear inverse problem -- A.5 Effects of changing the truncation basis: numerical evidence -- References -- Index.

---