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Nota di contenuto	Front matter -- Preface -- Contents -- Part I. Why to use Banach spaces in regularization theory? -- Part II. Geometry and mathematical tools of Banach spaces -- Part III. Tikhonov-type regularization -- Part IV. Iterative regularization -- Part V. The method of approximate inverse -- Bibliography -- Index
Sommario/riassunto	Regularization methods aimed at finding stable approximate solutions are a necessary tool to tackle inverse and ill-posed problems. Inverse problems arise in a large variety of applications ranging from medical imaging and non-destructive testing via finance to systems biology. Many of these problems belong to the class of parameter identification problems in partial differential equations (PDEs) and thus are computationally demanding and mathematically challenging. Hence there is a substantial need for stable and efficient solvers for this kind of problems as well as for a rigorous convergence analysis of these methods. This monograph consists of five parts. Part I motivates the importance of developing and analyzing regularization methods in

Banach spaces by presenting four applications which intrinsically demand for a Banach space setting and giving a brief glimpse of sparsity constraints. Part II summarizes all mathematical tools that are necessary to carry out an analysis in Banach spaces. Part III represents the current state-of-the-art concerning Tikhonov regularization in Banach spaces. Part IV about iterative regularization methods is concerned with linear operator equations and the iterative solution of nonlinear operator equations by gradient type methods and the iteratively regularized Gauß-Newton method. Part V finally outlines the method of approximate inverse which is based on the efficient evaluation of the measured data with reconstruction kernels.