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Nota di bibliografia	Includes bibliographical references (pages [145]-149) and index.
Nota di contenuto	Several gradients -- Comparison of two gradients -- Continuous steepest descent in Hilbert space: Linear case -- Continuous steepest descent in Hilbert space: Nonlinear case -- Orthogonal projections, Adjoints and Laplacians -- Introducing boundary conditions -- Newton's method in the context of Sobolev gradients -- Finite difference setting: the inner product case -- Sobolev gradients for weak solutions: Function space case -- Sobolev gradients in non-inner product spaces: Introduction -- The superconductivity equations of Ginzburg-Landau -- Minimal surfaces -- Flow problems and non-inner product Sobolev spaces -- Foliations as a guide to boundary conditions -- Some related iterative methods for differential equations -- A related analytic iteration method -- Steepest descent for conservation equations -- A sample computer code with notes.
Sommario/riassunto	A Sobolev gradient of a real-valued functional is a gradient of that functional taken relative to the underlying Sobolev norm. This book shows how descent methods using such gradients allow a unified treatment of a wide variety of problems in differential equations. Equal emphasis is placed on numerical and theoretical matters. Several concrete applications are made to illustrate the method. These

applications include (1) Ginzburg-Landau functionals of superconductivity, (2) problems of transonic flow in which type depends locally on nonlinearities, and (3) minimal surface problems. Sobolev gradient constructions rely on a study of orthogonal projections onto graphs of closed densely defined linear transformations from one Hilbert space to another. These developments use work of Weyl, von Neumann and Beurling.