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Autore	Cursi Eduardo Souza de
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delta approximations"; "6.6 A Matlab® class for smoothed particle approximations"; "6.7 Green's functions"; "7: Functionals and Calculus of Variations"; "7.1 Differentials"; "7.2 Gateaux derivatives of functionals"; "7.3 Convex functionals"
"7.4 Standard methods for the determination of Gateaux derivatives"
7.5 Numerical evaluation and use of Gateaux differentials"; "7.6 Minimum of the energy"; "7.7 Lagrange's multipliers"; "7.8 Primal and dual problems"; "7.9 Matlab® determination of minimum energy solutions"; "7.10 First-order control problems"; "7.11 Second-order control problems"; "7.12 A variational approach for multiobjective optimization"; "7.13 Matlab® implementation of the variational approach for biobjective optimization"; "7.14 Exercises";
"Bibliography"; "Index"

Sommario/riassunto

This book is issued from a 30 years' experience on the presentation of variational methods to successive generations of students and researchers in Engineering. It gives a comprehensive, pedagogical and engineer-oriented presentation of the foundations of variational methods and of their use in numerical problems of Engineering. Particular applications to linear and nonlinear systems of equations, differential equations, optimization and control are presented. MATLAB programs illustrate the implementation and make the book suitable as a textbook and for self-study. The evolution of knowledge, of the engineering studies and of the society in general has led to a change of focus from students and researchers. New generations of students and researchers do not have the same relations to mathematics as the previous ones. In the particular case of variational methods, the presentations used in the past are not adapted to the previous knowledge, the language and the centers of interest of the new generations. Since these methods remain a core knowledge – thus essential - in many fields (Physics, Engineering, Applied Mathematics, Economics, Image analysis ...), a new presentation is necessary in order to address variational methods to the actual context.
