Book Reviews / Reseñas

CONVEX ANALYSIS AND NONLINEAR OPTIMIZATION. THEORY AND EXAMPLES, 2ND ED.

Jonathan Borwein and Lewis Adrian S. (2006)
CMS Books in Mathematics/Ouvrages de Mathemématiques de la SMC Xii+310
ISBN 10:0-387-29570-4
ISBN 13:978-29570-1

This book is divided into 11 chapters and provides a comprehensive presentation of the main features of convex analysis and non-linear optimisation. Each result is sustained by a set of theorems propositions and corollaries and includes rigorous proofs and clarifying discussions. They are complemented by a series of theoretical exercises.

It is a second edition of a previous one (see ZBl 0953.90001)

In Chapter 1 the needed theoretical background on Euclidean Spaces and Symmetric Matrices, for dealing with convexity, are given. The second chapter develops a similar study of Optimality Conditions, the so called Theorems of the Alternatives and the Max-functions. They may be considered as an introductory part, unneeded in some courses. Its third chapter deals with functions, which do not require to be differentiable. An alternative approach to the usual Karush-Kuhn-Tucker (KKT) conditions are established. Different properties of convex functions are established within the Fenchel Duality theoretical frame. The fourth chapter deals with onvex Analysis where the key relation for studying duality is studied.. The Convex function-Fenchel conjugate is considered. The fifth chapter presents some consequences of the advanced concepts discussed previously. Henceforth Polyhedral convex functions, Eigenvalues functions, Duality for Linear Semi definite Programming, as well as Convex Duality are discussed using these concepts. Chapter 6 is devoted to the study of Nonsmooth Optimisation where non-smooth max-formulae, calculus and non-smooth necessary conditions theorems are discussed. A similar study is made of Regularity and Regularity of convex functions, strict differentiability, unique Clarke's sub gradient exact penalization, and other related problems. KKT theory is the theme of chapter 7, which introduces the necessary metric regularity concepts and results, which allows to revisit KKT theorem establishing KKT and Second order necessary and sufficient condition s. Chapter 8 deals with Fixed Points where Brouwers´s theorem as well as Kakutani-Fan results are proved. Variational inequalities are studied extensively. Chapter 9 revisits non-smooth problems establishing how to deal when more complicated structures are present. Then Rademacher´s theorem is proved, when some changes are introduced into the original hypothesis, a proximal normal formula is introduced and Clarke´s results are reworked conveniently and Partly smooth sets are considered and the previously derived results are visited considering their role in sensitive analysis of optimisation problems. Chapter eleven presents a list with the results (theorems, propositions, exercises of theoretical importance etc.) clustered by sections and chapters and the used notation is given.

This book is recommended for an advanced course in analysis for mathematicians or as for a first graduate course for students involved with optimisation theory.

C. N. Bouza
Universidad de La Habana

ITALIAN MATHEMATICS BETWEEN THE TWO WORLD WARS

Angelo Guerraggio and Pietro Nastasi (2005)
Birkhäuser X+300
ISBN 10: 3-7643-6555-2
ISBN 13: 978-3-7643-6555-4
ESBN 10: 3-7643-7512-4 94.16€

From the fact that 1860 is the starting point of modern Italy, the authors cope with the task of refereeing the work of Italian mathematicians in the intervals between the two World Wars.

The prologue established the role in the nation building played by mathematicians as politicians and administrators. They presented in the book how several Italians were at the front line of mathematics with Volterra as the most distinguished one. Italians worked mainly in mathematics physics (Volterra), algebraic geometry (Castelnouvo, Enriques and Severi). The authors considered that 1914 closed that initial period. Chapter 3 is devoted to establish the role of Volterra in the integration of mathematics into the Unione Matematica Italiana and the Consiglio Nazionalle delle Richerche and within the European scenery. Chapter 4 is remarkable as it presents how mathematics and mathematicians behaved when Mussolini appeared as a head of Italian politics. Many mathematicians opposed to his educative reforms promoted by the regime but Enriques leaded the integrism. Chapter 5 dealt with the role of Severi in the 1920´s decade. Severi was initially a socialist and resigned as rector in 1925 but he was forced to integrate the fascist party. Gentile produced a manifesto, which was circulated, and a contra-manifesto allowed to identify the political positions of the intellectuals. The leadership of mathematics, headed initially by Volterra a liberal, was switched to Severi who admitted to be under the umbrella of the party. During that decade Severi addressed to work in the systemization of algebraic geometry. A similar work was developed by Cipolla in Group Theory, Scorza in the foundations of the theory of Abelian varieties, Vitale in differential geometry, Fubini in projective-differential geometry. Their leading work and the role of other mathematicians is discussed.

The publication of books in different areas of mathematics and their role in the development of mathematics in Italy during the 10930´s decade is presented. Chapter 6 presents how the generation who grew with fascism took leading roles then. Chapter 7 documents how Italian mathematicians were well recognized within International Mathematical union. Cesari who moved to USA in 1948 leaded analysis. The development of the schools in analysis leaded by Tonelli and Picone is discussed.

The rest of the book describes different aspects of the work of mathematicians and the restriction placed by fascism. The correlation between the rise of fascism and the expulsion of Jews from the academy (Beppo Levi, Fubini, among others) was focused.

Serguei Panov
BROUQE Consultors

MATEMÁTICA NUMÉRICA

Manuel Álvarez Blanco, Arnaldo Gómez Montenegro, Alfredo Guerra Hernández y Rogelio Lau Fernández (2003)
Editorial Félix Varela viii+488

Este es un libro de texto que se divide en 7 capítulos El primero Orta de introducir los conceptos generales d la matemática numérica. El resto se dedica a presentar los métodos para problemas particulares como la solución de ecuaciones (métodos para la obtención de raíces, Regula-Falsi, Newton, Gauss, iterativos), la aproximación de funciones (métodos de interpolación, Lagrange, diferencias finitas, y estudio de errores), integración numérica (métodos de los rectángulos, trapecios, Simpson, Newton-Cates, Gauss y Romberg), el problema de las ecuaciones diferenciales ordinarias es planteado a través del problema de Cauchy. Se cierra con el estudio de las ecuaciones de contorno numerosos ejercicios son presentados y resueltos Un estudio más amplio del uso de las programotecas y softwares existentes es un vacío notable en la obra. La

bibliografía referida es escasa y atrasada pues solo se refiere a libros clásicos publicados entre 1964 y 1978.

Juan P. Suárez Suárez
Colegio Panamericano de Computación Avanzada

MATEMÁTICA NUMÉRICA Volumen 2

Manuel Álvarez Blanco, Alfredo Guerra Hernández y Rogelio Lau Fernández (2006)
Editorial Félix Varela vii+296

Este libro es un complemento del libro MATEMÁTICA NUMÉRICA de los autores Manuel Álvarez Blanco, Arnaldo Gómez Montenegro, Alfredo Guerra Hernández y Rogelio Lau Fernández, editado por esa editorial en el 2003. Como este se divide en 7 capítulos Se revisita el problema de la integración numérica de ecuaciones diferenciales ordinarias. Se trata también el problema de la optimización

Juan P. Suárez Suárez
Colegio Panafricano de Computación Avanzada