



BOOK REVIEWS

Alexandru Kristály, Vicențiu D. Rădulescu & Csaba Varga, *Variational Principles in Mathematical Physics, Geometry, and Economics. Qualitative Analysis of Nonlinear Equations and Unilateral Problems*, Series: Encyclopedia of Mathematics and its Applications (No. 136), Cambridge University Press, Cambridge, UK, 2010, 384pp., Hardback (ISBN-13: 9780521117821)

Given the strong influence that physics has had on the development of applied mathematics, it is not surprising that the underlying idea—establishing interesting properties by linking them to minimizing properties of an associated function—has broader implications. Theorems that embody this approach are called variational principles.

This monograph is intended to offer a comprehensive introduction to the modern theory of variational principles, by using some powerful and deep mathematical methods. This monograph is distinctive for bringing out the unifying role of variational principles across mathematical physics, differential geometry, and optimization in economics. Numerous examples illustrate the insights communicated by the authors, drawing on their experience as participants in the recent development of nonlinear analysis.

The content of the book is divided into three parts and 17 chapters, as follows.

Part I. *Variational Principles in Mathematical Physics*: 1. Variational principles; 2. Variational inequalities; 3. Nonlinear eigenvalue problems; 4. Elliptic systems of gradient type; 5. Systems with arbitrary growth nonlinearities; 6. Scalar field systems; 7. Competition phenomena in Dirichlet problems; 8. Problems to Part I;

Part II. *Variational Principles in Geometry*: 9. Sublinear problems on Riemannian manifolds; 10. Asymptotically critical problems on spheres; 11. Equations with critical exponent; 12. Problems to Part II;

Part III. *Variational Principles in Economics*: 13. Mathematical preliminaries; 14. Minimization of cost-functions on manifolds; 15. Best approximation

problems on manifolds; 16. A variational approach to Nash equilibria; 17. Problems to Part III.

The authors have also included five appendices: A. Elements of convex analysis; B. Function spaces; C. Category and genus; D. Clarke and Degiovanni gradients; Appendix E. Elements of set-valued analysis.

Several exercises are proposed at the end of each chapter and a very extensive bibliography and a rich index are presented at the end of the book.

This book is a pleasure to read. It will be an excellent source, allowing the reader to build a proper intuition and to understand the basic facts of the theory. The monograph under review is primarily aimed at researchers and post-graduate students who are interested in a conceptually and mathematically clear and precise understanding of basic mathematical problems arising in the qualitative analysis of various problems arising in applications. This book is also strongly recommended to researchers in applied mathematics who study various linear and nonlinear phenomena, but it may also be useful and comprehensive for a broader community of mathematicians, physicists, and engineers. I deeply believe that the present book is one of the most important works in its field that have appeared until now. To conclude, this book provides the reader with an in-depth introduction to a rich and rapidly developing research area that has already produced remarkable results. It is beautifully written and the reviewer strongly recommends this book to anyone seeking a stylish, balanced, up-to-date survey of this central area of nonlinear partial differential equations.

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Swapan Kumar Adhikani, *Mesopotamian Astrology: The Mother of Modern Astronomy*, Dipali Publication, Howrat, west Bengal, India, 2009; v+58 pp.; ISBN 81-901643-5-X

This book has been published for the remembrance of Year of Astronomy, 2009. (There were four hundred years since Galileo Galilei first turned one of his telescopes to the night sky and made astonishing discoveries that changed mankind's conception on the world forever: mountains and craters on the Moon, a plethora of stars invisible to the naked eye, and moons around Jupiter. In the same year, 1609, Johannes Kepler published his *Astronomia Nova* in which he described the fundamental laws of planetary motion.)

The author tries to prove, by using the huge amount of informations found in a large collection, called *Enuma-Anu-Enlil*, written in the Seleucid times about 800 B.C. of tablets containing astronomical omens from all periods, and in two tablets on astronomical context, called *Mul-Apin*, that the modern astronomy has been sprung from Babylon. The first chapter summarizes the basic astronomical facts known in Babylon, with tablet texts translated into English by the author: the zodiacal signs, the duration of the daylight for different days, the position of the moon and moreover the new one, the stars and the planets - their positions during years, the Sun, the eclipses etc.

The examples are well-chosen and the Reader can understand how many things came from Babylon. The other chapters are devoted to the known facts from the tablets about Mercury, Venus, Jupiter, Saturn, Moon, Sun.

We get sometimes the Sumerian text written from the transcription of the cuneiforms, as well as the English translation and the comments of the author.

We cannot say anything about the translations, but the ideas are clearly exposed.

This is a book for specialists but can be used also by ordinary people to know more about Babylon.

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