

Book reviews

John R. Graef, Johnny Henderson, Abdelghani Ouahab; Topological Methods for Differential Equations and Inclusions, CRC Press, Taylor & Francis Group, Boca Raton, FL, USA, 2019, xiv + 360 pp., ISBN 9781138332294 - CAT# K393112.

In the last 30 years, Nonlinear Analysis became a topic with a flourishing development. Part of this field, Multi-valued Analysis has experienced a spectacular growth, generating new research directions in various classical areas of mathematics. In this respect, the study of integral and differential inclusions gets a strong evolution. The present book brings an important contribution to these fields, by presenting, in a unified and exhaustive manner, many interesting results from the theory of Differential Equations and Inclusions, via Multi-valued Analysis and Topological Fixed Point Theory.

The contents of this monograph is organized in the following chapters: 1. *Background in Multi-valued Analysis*; 2. *Hausdorff-Pompeiu Metric Topology*; 3. *Measurable Multi-functions*; 4. *Continuous Selection Theorems*; 5. *Linear Multivalued Operators*; 6. *Fixed Point Theorems*; 7. *Generalized Metric and Banach Spaces*; 8. *Fixed Point Theorems in Vector Metric and Banach Spaces*; 9. *Random Fixed Point Theorem*; 10. *Semi-groups*, 11. *Systems of Impulsive Differential Equations on the Half-line*; 12. *Differential Inclusions*; 13. *Random Systems of Differential Equations*; 14. *Random Fractional Differential Equations via Hadamard Fractional Derivative*; 15. *Existence Theory for Systems of Discrete Equations*; 16. *Discrete Inclusions*; 17. *Semi-linear System of Discrete Equations*; 18. *Discrete Boundary Value Problems*; 19. *Appendix*.

The monograph is well written, the concepts and the results are presented in a clear and rigorous way. The material is based on numerous papers and books previously published by the authors. The bibliography includes 296 titles, most of them from the last decades. The book will be very useful for graduate students, professors and researchers interested in the field of integral and differential equations and inclusions, via topological methods of nonlinear functional analysis.

Adrian Petruşel

Julian Havil; Curves for the Mathematically Curious: An Anthology of the Unpredictable, Historical, Beautiful, and Romantic, Princeton University Press, 2019, xviii+280 p. ISBN 978-0-691-18005-2/hbk; 978-0-691-19778-4/ebook.

The book contains ten chapters, each one describing a famous curve: 1. *The Euler curves*; 2. *The Weierstrass curve*; 3. *Bézier curves*; 4. *The rectangular hyperbola*; 5. *The quadratrix of Hippias*; 6. *The space filling curves*; 7. *Curves of constant width*; 8. *The normal curve*; 9. *The catenary*, and 10. *Elliptic curves*.

Of course, this choice reflects author's taste and ideas, an important omission being that of conic sections (briefly mentioned in Appendix B as solutions of a differential equation), but as the author says "not every anthology of poems contains works by Shakespeare".

The book is dedicated to a mathematically inclined large audience, so it is written in a didactic style with a lot of mathematical details, historical detours and witty remarks of the author. As he writes in the Preface:

We invite the reader to join us in this particular and eclectic mathematical adventure, with stories bringing us into glancing contact with (among others) Pablo Picasso, George II, Queen Victoria's consort (Prince Albert), the Inquisition, the Holy Roman Emperor (Frederick II) and many mathematicians who existed over millennia.

The author is well-known for his popular books on various topics in mathematics: *Gamma: Exploring Euler's Constant* (2003); *Nonplussed! Mathematical Proof of Implausible Ideas* (2007); *Impossible? Surprising Solutions to Counterintuitive Conundrums* (2008); *The Irrationals: A Story of the Numbers You Can't Count On* (2014), and *John Napier: Life, Logarithms, and Legacy* (2014). All these books were published with Princeton and each of them knew several editions (we quoted the year of the first one). Two of them were translated into German.

Undoubtedly that this new one, written in the same entertaining unmistakable style of the author and containing a lot of information – mathematical, historical and general – will attract, as the previous ones, a large audience.

S. Cobzaş