

Book Reviews

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BOOK REVIEWS

Riečan, B. — Neubrunn, T.: INTEGRAL, MEASURE, AND ORDERING.
Kluwer Academic Press, Dordrecht, and Ister Science, Bratislava 1997, 378 pp.
ISBN 0-7923-4566-5 (Kluwer Academic Press)
ISBN 80-88683-18-1 (Ister Press)

The monograph under review can be regarded as a free continuation of the successful book in Slovak language: Neubrunn, T.– Riečan, B.: *Miera a integrál*, Veda, Bratislava, 1981, 1992.

The present book gives an introduction to measure theory and integration on ordered space, and it presents an outstanding overview of probability methods applied to algebraic and fuzzy structures like quantum logics, fuzzy quantum spaces, and MV-algebras.

The book consists of 11 chapters and two appendixes.

Chapter 1 is introductory with an elementary introduction to fuzzy set theory.

Chapter 2 gives an original approach to the convergence of sequences of measurable functions. It is based on two notions: Null sets and small systems. Here these notions are considered from the point of view of fuzzy sets.

Chapter 3 deals with measures on ordered spaces. Two known concepts of measure theory, a measure as a set function and a measure as a functional, are presented in this chapter, and the authors bring them as a special case of a function defined on a lattice.

Subadditive measures are studied in **Chapter 4**, where Daniell's integration scheme, and subadditive measures and integrals are presented.

Chapter 5 is sacrificed to the Kurzweil integral on ordered spaces. The Kurzweil integral is an important generalization of the Riemann integral.

Quantum logics, axiomatized models of quantum physics, are studied in **Chapter 6**. These models present a non-Kolmogorovian model of probability theory.

Fuzzy quantum spaces, **Chapter 7**, were introduced by B. Riečan at the end of eighties as a fuzzy generalization of Kolmogorov models using ideas of quantum logics.

Fuzzy quantum logics, **Chapter 8**, give another attempt of axiomatization starting from quantum logics which use fuzzy set ideas. Zadeh's and Lukasiewicz's connectives, which model set-theoretical union and intersection, respectively, are studied. Here one study joint distribution of observables and different types of convergences.

MV-algebras, **Chapter 9**, were introduced by C. C. Chang in 1958. Today they represent an interesting model which is studied in the book from the point of view of probability measure. We underline only that it seems that MV-algebras will play a similar role among quantum structures as Boolean algebras play among quantum logics.

The entropy of fuzzy dynamical systems, **Chapter 10**, presents a successful attempt for a generalization of Kolmogorov-Sinai entropy for fuzzy sets. This notion is studied mainly in the frames of fuzzy quantum spaces.

Measurability and integrability of multifunctions is the title of **Chapter 11**.

Every chapter is accomplished by Problems and Notes and comments.

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Appendix A was written by F. Chovanec and F. Kôpka, and it is devoted to actual problems of D-posets which were introduced by these two authors at the beginning of nineties. D-posets cover MV-algebras, quantum logics, as well as some fuzzy structures.

Appendix B was written by H. Kirchheimová and Z. Riečanová, and it is dedicated to the study of order convergence and order topology on posets.

A rich list of references gives, in particular, a comprehensive overlook to the Slovak school of measure theory. The monograph is well-came to mathematical literature, and it is an inspiring source of ideas and modern methods of measure theory which can be fruitful for students as well as for specialists.

Anatolij Dvurečenskij, Bratislava