

Riečan, Beloslav; Neubrunn, Tibor

Integral, measure, and ordering. (English) Zbl 0916.28001

Mathematics and its Applications (Dordrecht). 411. Dordrecht: Kluwer Academic Publishers. Bratislavia: Ister Science. xiii, 378 p. (1997).

The book under review deals with three main topics, namely the measure theory on ordered structures, fuzzy set theory, and constructions of quantum mechanics models based on fuzzy sets. There are 11 chapters and 2 appendices, the first appendix on D -posets and the second one on order convergence and order topology.

The first five chapters are devoted to generalizations of some of the basic theorems in classical measure and integration theories in the set up of ordered spaces such as Riesz spaces, lattice ordered groups, etc. Chapter 6 gives an introduction to quantum logic theory. As an alternative to the model given in Chapter 6, using the fuzzy set theory, two distinct models are given in Chapters 7 and 8. While the model in Chapter 7 is based on Zadeh connectives which leads to Boolean algebras, the model in Chapter 8 is based on Łukasiewicz connectives and has scope for further development. The authors believe that the results of Chapter 8 can be generalized to MV-algebras and D -posets. Chapter 9 is devoted to probability on MV-algebras. In Chapter 10 the Kolmogorov-Sinaj theory of entropy of dynamical systems is reviewed, where fuzzy partitions are used instead of set partitions and some applications to physics are given. Chapter 11 gives a good treatment of measurability and integrability of multifunctions.

All the chapters except the first one have a set of problems which extend the results or contain some difficult proofs (with hints). The bibliography is quite vast and is a useful source of information. The book treats many recent results and each chapter ends with some historical notes on the original sources and on possible extensions or generalizations.

In short, the book will be an asset to researchers and students, who work in these fields.

Reviewer: [V.Panchapagesan Thiruyaiyaru \(Merida\)](#)

MSC:

- [28-01](#) Introductory exposition (textbooks, tutorial papers, etc.) pertaining to measure and integration
- [06-01](#) Introductory exposition (textbooks, tutorial papers, etc.) pertaining to ordered structures
- [28E10](#) Fuzzy measure theory
- [03G12](#) Quantum logic
- [81P10](#) Logical foundations of quantum mechanics; quantum logic (quantum-theoretic aspects)

Cited in **12** Reviews
Cited in **81** Documents

Keywords:

measure theory on ordered structures; quantum mechanics models; fuzzy sets; D -posets; integration; Riesz spaces; lattice ordered groups; quantum logic; Zadeh connectives; Łukasiewicz connectives; MV-algebras; Kolmogorov-Sinaj theory; entropy of dynamical systems