Although there are some books dealing with algebraic theory of automata, their contents consist mainly of Krohn-Rhodes theory and related topics. The topics in the present book are rather different. For example, automorphism groups of automata and the partially ordered sets of automata are systematically discussed. Moreover, some operations on languages and special classes of regular languages associated with deterministic and nondeterministic directable automata are dealt with. The book is self-contained and hence does not require any knowledge of automata and formal languages.

My Personal Review:
Algebraic Theory of Automata & Languages by Masami Ito (World Scientific Publishing Company) Although there are some books dealing with algebraic theory of automata, their contents consist mainly of Krohn-Rhodes theory and related topics. The topics in the present book are rather different. For example, automorphism groups of automata and the partially ordered sets of automata are systematically discussed. Moreover, some operations on languages and special classes of regular languages associated with deterministic and nondeterministic directable automata are dealt with. The book is self-contained and hence does not require any knowledge of automata and formal languages.

The theory of formal languages began with the classification of languages by N. Chomsky in Syntactic Structures in 1957. Now, this classification is called the Chomsky hierarchy of languages. On the other hand, the theory of automata was initiated by M.O. Rabin and D. Scott in 1959. Their work can be regarded as the most important first step in the theory of automata in spite of its simplicity. Since then, these two fields have been developed by many researchers as the two most important theoretical foundations of computer science.

In this book, the author mainly handles formal languages and automata from the algebraic point of view. In the first two chapters, Ito investigates the algebraic structure of automata and then he deals with a kind of global
theory, that is, partially ordered sets of automata. In the following four chapters, he studies grammars, languages and operations on languages. In the last section, Ito introduces special kinds of automata, i.e. directable automata. The subjects in the book seem to be unique compared to other books with similar titles. The contents of the book are based on the authors work which started in the mid 1970s. His work offers some alternative ways to conceptualize ideas in Wolframs New Kind of Science.

This book consists of 9 chapters:
* In Chapter 1, Ito mainly deals with the automorphism groups of strongly connected automata and \((n, G)\)-automata, that is representations of strongly connected automata.
* In Chapter 2, he generalizes the results in Chapter 1 to the class of general automata.
* In Chapter 3, he considers partially ordered sets of automata where partial orders are induced by homomorphisms of automata.
* In Chapter 4, he deals with the compositions and decompositions of regular languages under \(n\)-insertion and shuffle operations. Moreover, Ito considers a decidability problem with respect to the shuffle closures of regular commutative languages.
* In Chapter 5, he determines the structure of a shuffle closed language.
* In Chapter 6, insertion and deletion operations is treated in details.
* In Chapter 7, shuffle and scattered deletion operations is dealt with.
* In Chapter 8, first Ito provides the concept of directable automata and then the deals with nondeterministic directable automata.

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