

Algebraic Structures and Operator Calculus

Mathematics and Its Applications

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Algebraic Structures and Operator Calculus

Volume II: Special Functions and Computer Science

by

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To our parents
In memoriam: Leo and Cecilia, Joseph and Anne

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Preface

In this volume we will present some applications of special functions in computer science. This largely consists of adaptations of articles that have appeared in the literature. Here they are presented in a format made accessible for the non-expert by providing some context. The material on group representations and Young tableaux is introductory in nature. However, the algebraic approach of Chapter 2 is original to the authors and has not appeared previously. Similarly, the material and approach based on Appell states, so formulated, is presented here for the first time.

As in all volumes of this series, this one is suitable for self-study by researchers. It is as well appropriate as a text for a course or advanced seminar.

The solutions are tackled with the help of various analytical techniques, such as generating functions, and probabilistic methods/insights appear regularly. An interesting feature is that, as has been the case in classical applications to physics, special functions arise — here in complexity analysis. And, as in physics, their appearance indicates an underlying Lie structure.

Our primary audience is applied mathematicians and theoretical computer scientists. We are quite sure that pure mathematicians will find this volume interesting and useful as well.

We expect this volume to have a utility between a reference and a monograph. We wish to make available in one volume a group of works and results scattered in the literature while providing some background to the mathematics involved which the reader will no doubt find appealing in its own right.

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