

Representations of Linear Groups

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出版者:Vieweg+Teubner Verlag

出版时间:2007-7-26

装帧:

isbn:9783834803191

This is an elementary introduction to the representation theory of real and complex matrix groups. The text is written for students in mathematics and physics who have a good knowledge of differential/integral calculus and linear algebra and are familiar with basic facts from algebra, number theory and complex analysis. The goal is to present the fundamental concepts of representation theory, to describe the connection between them, and to explain some of their background. The focus is on groups which are of particular interest for applications in physics and number theory (e.g. Gell-Mann's eightfold way and theta functions, automorphic forms). The reader finds a large variety of examples which are presented in detail and from different points of view. The examples motivate the general theory well covered already by the existing literature. Hence for complete proofs of most of the essential statements and theorems the reader is often referred to the standard sources. Plenty of exercises are included in the text. Some of these exercises and/or omitted proofs may give a starting point for a bachelor thesis and further studies in a master program.

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目录: Prologue: Some Groups and their Actions
Basic Algebraic Concepts for Group Representations
Representations of Finite Groups
Continuous Representations
Representations of Compact Groups
Representations of Abelian Groups
The Infinitesimal Method
Induced Representations
Geometric Quantization and the Orbit Method

Epilogue: Outlook to Number Theory · · · · · (收起)

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