

<<李群>>

图书基本信息

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## 前言

This book aims to be a course in Lie groups that can be covered in one year with a group of good graduate students. I have attempted to address a problem that anyone teaching this subject must have, which is that the amount of essential material is too much to cover. One approach to this problem is to emphasize the beautiful representation theory of compact groups, and indeed this book can be used for a course of this type if after Chapter 25 one skips ahead to Part III. But I did not want to omit important topics such as the Bruhat decomposition and the theory of symmetric spaces. For these subjects, compact groups are not sufficient.

Part I covers standard general properties of representations of compact groups (including Lie groups and other compact groups, such as finite or  $p$ -adic ones). These include Schur orthogonality, properties of matrix coefficients and the Peter-Weyl Theorem. Part II covers the fundamentals of Lie groups, by which I mean those subjects that I think are most urgent for the student to learn. These include the following topics for compact groups: the fundamental group, the conjugacy of maximal tori (two proofs), and the Weyl character formula. For noncompact groups, we start with complex analytic groups that are obtained by complexification of compact Lie groups, obtaining the Iwasawa and Bruhat decompositions. These are the reductive complex groups. They are of course a special case, but a good place to start in the noncompact world. More general noncompact Lie groups with a Cartan decomposition are studied in the last few chapters of Part II. Chapter 31, on symmetric spaces, alternates examples with theory, discussing the embedding of a noncompact symmetric space into its compact dual, the boundary components and Bergman-Shilov boundary of a symmetric tube domain, anti-Cartan classification. Chapter 32 constructs the relative root system, explains Satake diagrams and gives examples illustrating the various phenomena that can occur, and reproves the Iwasawa decomposition, formerly obtained for complex analytic groups, in this more general context. Finally, Chapter 33 surveys the different ways Lie groups can be embedded in one another.

## 内容概要

《李群（英文版）》 Part I covers standard general properties of representations of compact groups ( including Lie groups and other compact groups , such as finite or p-adic ones ) . These include Schur orthogonality , properties of matrix coefficients and the Peter-Weyl Theorem. Part II covers the fundamentals of Lie groups , by which I mean those subjects that I think are most urgent for the student to learn. These include the following topics for compact groups : the fundamental group , the conjugacy of maximal tori ( two proofs ) , and the Weyl character formula. For noncompact groups , we start with complex analytic groups that are obtained by complexification of compact Lie groups , obtaining the Iwasawa and Bruhat decompositions. These are the reductive complex groups. They are of course a special case , but a good place to start in the noncompact world. More general noncompact Lie groups with a Cartan decomposition are studied in the last few chapters of Part II. Chapter 31 , on symmetric spaces , alternates examples with theory , discussing the embedding of a noncompact symmetric space into its compact dual , the boundary components and Bergman-Shilov boundary of a symmetric tube domain , anti Cartan classification. Chapter 32 constructs the relative root system , explains Satake diagrams and gives examples illustrating the various phenomena that can occur , and reproves the Iwasawa decomposition , formerly obtained for complex analytic groups , in this more general context. Finally , Chapter 33 surveys the different ways Lie groups can be embedded in one another.

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