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BY

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*Professor of Mathematics
at Bedford College, London*

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PREFACE

The theory of Lie groups rests on three pillars: analysis, topology and algebra. Correspondingly it is possible to distinguish several phases, overlapping in some degree, in its development. It also allows one to regard the subject from different points of view, and it is the algebraic standpoint which has been chosen in this tract as the most suitable one for a first introduction to the subject.

The aim has been to develop the beginnings of the theory of Lie groups, especially the fundamental theorems of Lie relating the group to its infinitesimal generators (the Lie algebra); this account occupies the first five chapters. Next to Lie's theorems in importance come the basic properties of subgroups and homomorphisms, and they form the content of Chapter VI. The final chapter, on the universal covering group, could perhaps be most easily dispensed with, but, it is hoped, justifies its existence by bringing back into circulation Schreier's elegant method of constructing covering groups.

Of course whatever outlook is adopted, it is necessary to have a number of tools at one's disposal, and these have been provided in the book as far as possible. Thus before we come to Lie groups proper, the notions of analytic manifold and topological group are introduced. Lie algebras and exterior algebras are brought in later as they are needed, while theorems from analysis, such as the existence theorem for the solutions of total differential equations and the implicit function theorem, are proved in an appendix. It has been assumed that the reader has some knowledge of algebra and topology, but this need only include the elementary properties of groups and vector spaces, and the elementary notions of analytic topology.

This book owes a great deal to my colleagues in Manchester; when I gave a course on the subject in 1954, their comments showed me how much I had still to learn, and I had some opportunity of doing so in subsequent discussions with them. In particular, Dr Graham Higman and Mr G. E. H. Reuter, with

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P R E F A C E

their advice and comments on the earlier parts of the manuscript, saved me from a number of errors. Dr J. A. Green read the whole manuscript and made many valuable suggestions, and Dr P. J. Hilton read parts of the manuscript including the last chapter, which was much improved as a result. To all of them I should like to express my gratitude.

P. M. C.

MANCHESTER
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