

Preface

During the past few decades analytical methods are being increasingly applied to group representation theory which primarily developed as a branch of algebra in the hands of Frobenius and Schür. Although the application of analytical methods is now the standard approach in Lie groups there is as yet no standard textbook dealing with classical and modern analysis as applied especially to locally compact groups.

It is expected that this gap will be bridged by this book which is essentially an amplification of the lectures of the author to M.Sc. students of the Physics Department of Indian Institute of Technology, Kharagpur. For clarity many standard topics in this book have been treated in a way which substantially differs from traditional treatment and is in a more teachable form.

The author himself does not understand the sophistry of pure mathematics and those who look for elegance and rigour will be sorely disappointed. The book does not provide the most general topological definition of Lie groups, not that the author is unwilling to learn it, but that it is deemed inessential in a preliminary course which this book intends to cover. In a sense, following Ivan Karamazov, discussions are all conducted “as stupidly as possible . . .” because “the stupider, the more to the point. The stupider, the clearer. Stupidity is brief and artless but intelligence shifts and shuffles and hides itself. Intelligence is a knave, while stupidity is straightforward and honest.”

Even a casual reader browsing through this book will not fail to notice the indebtedness of the author to the Russian masters of functional analysis and representation theory. Of course, this does not come anywhere near their magnum opus in depth, breadth of coverage and originality; it is only a modest endeavour to make accessible to the graduate students the fundamentals of the subject created by them.

The first eight chapters of this book may be covered in any traditional graduate course in mathematical physics. In particular later parts

of Chapter 8 supplies the mathematical framework of the octet model of Gell-Mann and Neéman which is the foundation of the present day quark model, an inseparable part of standard model. The remaining three chapters deal with infinite dimensional representations of the simplest locally compact groups, namely, $SL(2, \mathbb{R})$, $SL(2, \mathbb{C})$ and the Heisenberg–Weyl group. They are becoming increasingly important in several areas of quantum optics and quantum gravity.

The references at the end of each chapter are those that have been consulted by the author and are a reflection of personal taste rather than anything else.

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Debabrata Basu

Acknowledgment

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