
Preface

Since the advent of Kac–Moody algebras in the late 1960s, infinite-dimensional Lie theory has become one of the core areas of modern mathematics. The global theory of infinite-dimensional Lie groups developed through several stages, starting with the class of Banach–Lie groups in the 1960s. In the 1980s it became apparent that more general classes of groups, such as smooth loop groups, were needed to meet the requirements of various kinds of applications. The core of infinite-dimensional Lie theory lies at the translation of the global group picture to the infinitesimal Lie algebra picture, where the means are often based on geometric structures such as fiber bundles on (possibly infinite-dimensional) manifolds on which the groups act by transformations and on which the Lie algebra is realized by vector fields.

The idea for the present book came up during an Oberwolfach meeting on infinite-dimensional Lie theory. Its purpose is to describe some of the current developments and trends in infinite-dimensional Lie theory. Many of these developments have been motivated by connections with other branches of mathematics. Accordingly, the book is divided into three main parts:

- (A) Infinite-dimensional Lie (super-)algebras;
- (B) Geometry of infinite-dimensional Lie (transformation) groups;
- (C) Representation theory of infinite-dimensional Lie groups.

The different contributions clearly demonstrate the breadth of Lie theory in the infinite-dimensional context. It is also our intention to display the connectedness among the algebraic, geometric, and analytic branches, which are different faces of a general theory with many different aspects.

Acknowledgments. All contributions to this book have been refereed, with some of them going through several stages of rewriting until they reached their final form. The editors are grateful to the referees for their efficient help.

We thank the *Mathematisches Forschungsinstitut Oberwolfach* for hosting the conference where this book was conceived.

Last but not least we express our appreciation to Birkhäuser Boston, in particular Ann Kostant and Tom Grasso as acting representatives for a remarkably pleasant cooperation.

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March 2008

Developments and Trends in Infinite-Dimensional Lie
Theory

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2011, VIII, 492 p. 9 illus., Hardcover

ISBN: 978-0-8176-4740-7

A product of Birkhäuser Basel