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**Sinopsis**

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Gradings are ubiquitous in the theory of Lie algebras, from the root space decomposition of a complex semisimple Lie algebra relative to a Cartan subalgebra to the beautiful Dempwolff decomposition of  $E_8$  as a direct sum of thirty-one Cartan subalgebras. This monograph is a self-contained exposition of the classification of gradings by arbitrary groups on classical simple Lie algebras over algebraically closed fields of characteristic not equal to 2 as well as on some nonclassical simple Lie algebras in positive characteristic. Other important algebras also enter the stage: matrix algebras, the octonions, and the Albert algebra. Most of the presented results are recent and have not yet appeared in book form. This work can be used as a textbook for graduate students or as a reference for researchers in Lie theory and neighboring areas.

This book is published in cooperation with Atlantic Association for Research in the Mathematical Sciences (AARMS).

**Readership**

Graduate students and research mathematicians interested in Lie algebras, gradings, and connections of Lie algebras with other algebraic structures.

**Reviews**

"This monograph provides a self-contained and comprehensive treatment of gradings on simple Lie algebras. But it is much broader in scope, as along the way, and as a tool for determining such gradings, it provides the classification of gradings on matrix algebras, Albert algebras, octonions and related composition algebras. Researchers working on division algebras and orders of associative algebras will find the book a very valuable resource, as will anyone working on nonassociative algebras.

"The text gives a unified framework for further investigations on gradings. The introduction

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provides an excellent overview of the state of the art, as well as convincing motivation for studying gradings. A wealth of material is included in the manuscript, and no doubt it will become the standard reference on the topic."