

An Introduction to Lie Groups and the Geometry of Homogeneous Spaces (Student Mathematical Library, V. 22)

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It is remarkable that so much about Lie groups could be packed into this small book. But after reading it, students will be well-prepared to continue with more advanced, graduate-level topics in differential geometry or the theory of Lie groups.

The theory of Lie groups involves many areas of mathematics: algebra, differential geometry, algebraic geometry, analysis, and differential equations. In this book, Arvanitoyeorgos outlines enough of the prerequisites to get the reader started. He then chooses a path through this rich and diverse theory that aims for an understanding of the geometry of Lie groups and homogeneous spaces. In this way, he avoids the extra detail needed for a thorough discussion of representation theory.

Lie groups and homogeneous spaces are especially useful to study in geometry, as they provide excellent examples where quantities (such as curvature) are easier to compute. A good understanding of them provides lasting intuition, especially in differential geometry.

The author provides several examples and computations. Topics discussed include the classification of compact and connected Lie groups, Lie algebras, geometrical aspects of compact Lie groups and reductive homogeneous spaces, and important classes of homogeneous spaces, such as symmetric spaces and flag manifolds. Applications to more advanced topics are also included, such as homogeneous Einstein metrics, Hamiltonian systems, and homogeneous geodesics in homogeneous spaces.

The book is suitable for advanced undergraduates, graduate students, and research mathematicians interested in differential geometry and neighboring fields, such as topology, harmonic analysis, and mathematical physics.

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