

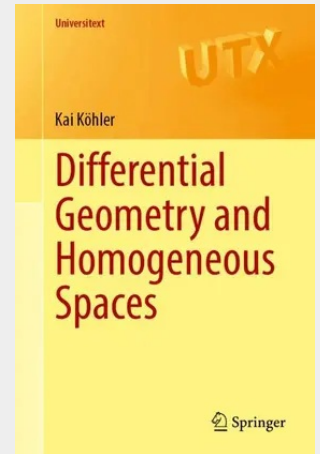
Differential Geometry and Homogeneous Spaces

This textbook offers a rigorous introduction to the foundations of Riemannian Geometry, with a detailed treatment of homogeneous and symmetric spaces, as well as the foundations of the General Theory of Relativity.

Starting with the basics of manifolds, it presents key objects of differential geometry, such as Lie groups, vector bundles, and de Rham cohomology, with full mathematical details. Next, the fundamental concepts of Riemannian geometry are introduced, paving the way for the study of homogeneous and symmetric spaces. As an early application, a version of the Poincaré–Hopf and Chern–Gauss–Bonnet Theorems is derived. The final chapter provides an axiomatic deduction of the fundamental equations of the General Theory of Relativity as another important application. Throughout, the theory is illustrated with color figures to promote intuitive understanding, and over 200 exercises are provided (many with solutions) to help master the material.

The book is designed to cover a two-semester graduate course for students in mathematics or theoretical physics and can also be used for advanced undergraduate courses. It assumes a solid understanding of multivariable calculus and linear algebra.

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58,84 €

54,99 € (zzgl. MwSt.)

Lieferfrist: bis zu 10 Tage

Artikelnummer: 9783662697207

Medium: Buch

ISBN: 978-3-662-69720-7

Verlag: Springer

Erscheinungstermin: 30.10.2024

Sprache(n): Englisch

Auflage: 2024

Serie: Universitext

Produktform: Kartoniert

Gewicht: 519 g

Seiten: 292

Format (B x H): 155 x 235 mm

