<<黎曼-芬斯勒几何导论>>

图书基本信息

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13位ISBN编号：9787510005053

10位ISBN编号：7510005051

出版时间：2009-8

出版时间：世界图书出版公司

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页数：425

前言

The subject matter of this book had its genesis in Riemanns 1854 "habil-itation" address："Uber die Hypothesen, welche der Geometrie zu Grundeliegen"（On the Hypotheses, which lie at the Foundations of Geometry）.Volume II of Spivaks Differential Geometry contains an English translationof this influential lecture, with a commentary by Spivak himself. Riemann, undoubtedly the greatest mathematician of the 19th century, aimed at introducing the notion of a manifold and its structures. The prob-lem involved great difficulties. But, with hypotheses on the smoothness ofthe functions in question, the issues can be settled satisfactorily and thereis now a complete treatment. Traditionally, the structure being focused on is the Riemannian metric, which is a quadratic differential form. Put another way, it is a smoothlyvarying family of inner products, one on each tangent space. The resultinggeometry —— Riemannian geometry —— has undergone tremendous develop-ment in this century. Areas in which it has had significant impact includeEinsteins theory of general relativity, and global differential geometry. In the context of Riemanns lecture, this restriction to a quadratic dif-ferential form constitutes only a special case. Nevertheless, Riemann sawthe great merit of this special case, so much so that he introduced for itthe curvature tensor and the notion of sectional curvature. Such was donethrough a Taylor expansion of the Riemannian metric. The Riemann curvature tensor plays a major role in a fundamental prob-lem. Namely：how does one decide, in principle, whether two given Rie-mannian structures differ only by a coordinate transformation？

This wassolved in 1870, independently by Christoffel and Lipschitz, using differentmethods and without the benefit of tensor calculus. It was almost 50 yearslater, in 1917, that Levi-Civita introduced his notion of parallelism（equiv-alent to a connection）, thereby giving the solution a simple geometricalinterpretation.

内容概要

The subject matter of this book had its genesis in Riemanns 1854 "habil-itation" address："Uber die Hypothesen, welche der Geometrie zu Grundeliegen"（On the Hypotheses, which lie at the Foundations of Geometry）.Volume II of Spivaks Differential Geometry contains an English translationof this influential lecture, with a commentary by Spivak himself. Riemann, undoubtedly the greatest mathematician of the 19th century, aimed at introducing the notion of a manifold and its structures. The prob-lem involved great difficulties. But, with hypotheses on the smoothness ofthe functions in question, the issues can be settled satisfactorily and thereis now a complete treatment. Traditionally, the structure being focused on is the Riemannian metric, which is a quadratic differential form. Put another way, it is a smoothlyvarying family of inner products, one on each tangent space. The resultinggeometry —— Riemannian geometry —— has undergone tremendous develop-ment in this century. Areas in which it has had significant impact includeEinsteins theory of general relativity, and global differential geometry. In the context of Riemanns lecture, this restriction to a quadratic dif-ferential form

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