

<<微分形式及其应用>>

图书基本信息

书名：<<微分形式及其应用>>

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前言

This is a free translation of a set of notes published originally in Portuguese in 1971. They were translated for a course in the College of Differential Geometry, ICTP, Trieste, 1989. In the English translation we omitted a chapter on the Frobenius theorem and an appendix on the nonexistence of a complete hyperbolic plane in euclidean 3-space (Hilbert's theorem). For the present edition, we introduced a chapter on line integrals.

In Chapter 1 we introduce the differential forms in R^n . We only assume elementary knowledge of calculus, and the chapter can be used as a basis for a course on differential forms for "users" of Mathematics. In Chapter 2 we start integrating differential forms of degree one along curves in R^n . This already allows some applications of the ideas of Chapter 1. This material is not used in the rest of the book. In Chapter 3 we present the basic notions of differentiable manifolds. It is useful (but not essential) that the reader be familiar with the notion of a regular surface in R^3 . In Chapter 4 we introduce the notion of manifold with boundary and prove Stokes theorem and Poincaré's lemma. Starting from this basic material, we could follow any of the possible routes for applications: Topology, Differential Geometry, Mechanics, Lie Groups, etc. We have chosen Differential Geometry. For simplicity, we restricted ourselves to surfaces. Thus in Chapter 5 we develop the method of moving frames of Elie Cartan for surfaces. We first treat immersed surfaces and next the intrinsic geometry of surfaces. Finally, in Chapter 6, we prove the Gauss-Bonnet theorem for compact orientable surfaces. The proof we present here is essentially due to S.S. Chern. We also prove a relation, due to M. Morse, between the Euler characteristic of such a surface and the critical points of a certain class of differentiable functions on the surface.

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内容概要

本书是一部简短的微分几何教程。

详细讲述了微分几何，并运用它们研究曲面微分几何的局部和全局知识。

引入微分几何的方式简洁易懂，使得这本书非常适合数学爱好者。

微分流形的介绍简明，具体，以致最主要定理Stokes定理很自然地呈现出来。

大量的应用实例，如用E. Cartan的活动标架方法来研究 R^3 中浸入曲面的局部微分几何以及曲面的内蕴几何。

最后一章集中所有来讲述紧曲面Gauss-Bonnet定理的Chern证明。

每章末都附有练习。

目次： R^n 中的微分几何；线性代数；微分流形；流形上的积分；曲面的微分几何；Gauss-Bonnet定理和Morse定理。

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书籍目录

Preface 1.Differential Forms in R^n 2.Line Integrals 3.Differentiable Manifolds 4.Integration on Manifolds; Stokes Theorem and Poincare's Lemma 1.Integration of Differential Forms 2.Stokes Theorem 3.Poincare's Lemma 5.Differential Geometry of Surfaces 1.The Structure Equations of R^3 2.Surfaces in R^3 3.Intrinsic Geometry of Surfaces 6.The Theorem of Gauss-Bonnet and the Theorem of Morse 1.The Theorem of Gauss-Bonnet 2.The Theorem of Morse References Index

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