

<<复变函数及应用>>

图书基本信息

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## 前言

This book is a revision of the seventh edition, which was published in 2004. That edition has served, just as the earlier ones did, as a textbook for a one-term introductory course in the theory and application of functions of a complex variable. This new edition preserves the basic content and style of the earlier editions, the first two of which were written by the late Ruel V. Churchill alone. The first objective of the book is to develop those parts of the theory that are prominent in applications of the subject. The second objective is to furnish an introduction to applications of residues and conformal mapping. With regard to residues, special emphasis is given to their use in evaluating real improper integrals, finding inverse Laplace transforms, and locating zeros of functions. As for conformal mapping, considerable attention is paid to its use in solving boundary value problems that arise in studies of heat conduction and fluid flow. Hence the book may be considered as a companion volume to the author's text "Fourier Series and Boundary Value Problems," where another classical method for solving boundary value problems in partial differential equations is developed. The first nine chapters of this book have for many years formed the basis of a three-hour course given each term at The University of Michigan. The classes have consisted mainly of seniors and graduate students concentrating in mathematics, engineering, or one of the physical sciences. Before taking the course, the students have completed at least a three-term calculus sequence and a first course in ordinary differential equations. Much of the material in the book need not be covered in the lectures and can be left for self-study or used for reference. If mapping by elementary functions is desired earlier in the course, one can skip to Chap. 8 immediately after Chap. 3 on elementary functions.

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### 内容概要

本书初版于20世纪40年代，是经典的本科数学教材之一，对复变函数的教学影响深远，被美国加州理工学院、加州大学伯克利分校、佐治亚理工学院、普度大学、达特茅斯学院、南加州大学等众多名校采用。

本书阐述了复变函数的理论及应用，还介绍了留数及保形映射理论在物理、流体及热传导等边值问题中的应用。

新版对原有内容进行了重新组织，增加了更现代的示例和应用，更加方便教学。

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### 作者简介

James Ward Brown密歇根大学迪尔本分校数学系教授，美国数学学会会员。  
1964年于密歇根大学获得数学博士学位。  
他曾经主持研究美国国家自然科学基金项目，获得过密歇根大学杰出教师奖，并被列入美国名人录。  
Ruel V.Churchill已故密歇根大学知名教授。  
早在60多年前，就开始编写一系列经典教材。  
除本书外，还与James Ward Brown合著《Fourier Series and Boundary Value Problems》。

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## 书籍目录

Preface 1 Complex Numbers Sums and Products Basic Algebraic Properties Further Properties Vectors and Moduli Complex Conjugates Exponential Form Products and Powers in Exponential Form Arguments of Products and Quotients Roots of Complex Numbers Examples Regions in the Complex Plane 2 Analytic Functions Functions of a Complex Variable Mappings Mappings by the Exponential Function Limits Theorems on Limits Limits Involving the Point at Infinity Continuity Derivatives Differentiation Formulas Cauchy-Riemann Equations Sufficient Conditions for Differentiability Polar Coordinates Analytic Functions Examples Harmonic Functions Uniquely Determined Analytic Functions Reflection Principle 3 Elementary Functions The Exponential Function The Logarithmic Function Branches and Derivatives of Logarithms Some Identities Involving Logarithms Complex Exponents Trigonometric Functions Hyperbolic Functions Inverse Trigonometric and Hyperbolic Functions 4 Integrals Derivatives of Functions  $w(t)$  Definite Integrals of Functions  $w(t)$  Contours Contour Integrals Some Examples Examples with Branch Cuts Upper Bounds for Moduli of Contour Integrals Antiderivatives Proof of the Theorem Cauchy-Goursat Theorem Proof of the Theorem 5 Series 6 Residues and Poles 7 Applications of Residues 8 Mapping by Elementary Functions 9 Conformal Mapping 10 Applications of Conformal Mapping 11 The Schwarz-Christoffel Transformation 12 Integral Formulas of the Poisson Type Appendixes Index

## 章节摘录

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