

PREFACE

Theory of functions of a complex variable (complex functions) is a basic course for undergraduate students major in any branch of natural science and technology. There are a lot of text-books in this field, among which many are excellent. This text would emphasize the application aspects of the theory and is written in contemporary and readable form. The back ground is only required in mathematical analysis (i.e., elementary and advanced calculus).

For the choice of materials in this book, we mainly consider the theory as a tool which plays an important role in modern science and engineering, so as the students could firmly master its basic elements and calculating techniques. In the meanwhile, we abandon those subjects only required for special majors. On the other hand, to emphasize the application does not mean to neglect the exact interpretation of the fundamental concepts and principles, though in their formulations we have strengthen certain conditions which are enough for applications, for instance, as the boundary of a region, we restrict ourselves to arcwise smooth closed contours instead of rectifiable curves, and keep the rigorousness in proofs and deductions.

Some important theorems (e.g., the Cauchy theorem) are established with simple proof, newly occurring in literature or afforded by ourselves. Some results such as the extended residue theorem with its application to evaluate certain integrals are included in the text, which were not appeared in published text-books. Certain topics in complex analysis are direct extensions from mathematical analysis, such as limit, continuity, convergence of series, etc., for which we only give brief descriptions and ask students to compare them with the latter and summarize their coinciderce and difference. According to our teaching experiences, the elementary multi-valued

analytic functions are hard to master for the beginners and the cause of difficulty arises from the multi-valued property of the argument function. Therefore, we give detailed and careful discussions on the latter so as to facilitate the understanding for students. It showed to be effective in our teaching in recent years.

By the end of many sections, we give some problems for meditation, which could be used for students to check whether they have correctly understood and mastered the related concepts, principles or theorems.

The exercises are given two levels: those put at the end of each section are of lower level, which are designed to consolidate the basic knowledge of students, and the others at the end of each chapter are of higher level, the solutions of which ask some comprehensive knowledge or skill, which may be used at option.

The first five chapters may be taken as text of one semester course for undergraduates and the remaining chapters, for graduates or senior undergraduates.

This text-book is specially fitted for students major in applied mathematics, mechanics, physics or engineering.

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