
PREFACE TO THE FOURTH EDITION

The purpose of this fourth edition is the same as the first three—to be read, understood, and enjoyed. Due to the extremely favorable comments from readers and users of the first three editions, virtually all of the earlier editions have been carried over intact to the fourth edition. Therefore, all the basic philosophy, approach, and content discussed and itemized by the author in the Preface to the First Edition is equally applicable now. Since that preface was repeated earlier, no further elaboration will be given.

The fourth edition carries over the special educational tools introduced in the Second and Third Editions, namely: (1) the use of roadmaps at the beginning of each chapter to guide the reader safely and securely through the material of each chapter, and to highlight the important flow of ideas, and (2) the design boxes that are scattered throughout the book. These design boxes are special sections for the purpose of discussing design aspects associated with the fundamental material covered throughout the book. These sections are literally placed in boxes to set them apart from the mainline text. Modern engineering education is placing more emphasis on design, and the design boxes in this book are in this spirit. They are a means of making the fundamental material more relevant, and making the whole process of learning aerodynamics more fun.

Question: What distinguishes the fourth edition from the first three? *Answer:* Much new material has been added in order to enhance, update, and expand that covered in the earlier editions. There are 51 new figures, and 50 inserts of new material. In particular, the fourth edition has two important new features:

1. The classic organization has been preserved, namely, the presentation of the fundamental principles of aerodynamics in Part 1, inviscid incompressible flow in Part 2, inviscid compressible flow in Part 3, and viscous flow in Part 4. Specific sections on viscous flow, however, have been added much earlier in the book in order to give the reader some idea of how the inviscid results are tempered by the influence of friction. This is done by adding self-contained viscous flow sections at the end of various chapters, written and placed in such a way that they do not interfere with the flow of the inviscid flow discussion, but are there to complement the discussion. For example, at the end of Chapter 4 on incompressible, inviscid flow over airfoils, there is a viscous flow section that deals with the prediction of skin-friction drag on such airfoils. A similar viscous flow section at the end of Chapter 12 deals with friction drag on high-speed airfoils. At the end of the chapters on shock waves and nozzle flows, there are viscous flow sections on shock-wave/boundary-layer interactions. And so forth.

2. Preview boxes have been introduced at the beginning of each chapter. These short sections, literally set in boxes, are to inform the reader in plain language what to expect from each chapter, and why the material is important and exciting. They are primarily motivational; they help to encourage the reader to actually enjoy reading the chapter, therefore enhancing the educational process.

The fourth edition also has many additional new worked examples. When learning new technical material, especially material of a fundamental nature as emphasized in this book, one can never have too many examples of how the fundamentals can be applied to the solution of problems.

In the same spirit, at the end of most chapters, new homework problems have been added to those carried over from the third edition.

Finally, as an aid with the worked examples and the new homework problems, tables of the Standard Atmosphere in both the SI and English Engineering units have been included as new Appendices.

All the new additional material notwithstanding, the main thrust of this book remains the presentation of the fundamentals of aerodynamics; the new material is simply intended to enhance and support this thrust. We repeat that the book is organized along classical lines, dealing with inviscid incompressible flow, inviscid compressible flow, and viscous flow in sequence (and now with the new self-contained viscous flow sections presented earlier in the book). My experience in teaching this material to undergraduates finds that it nicely divides into a two-semester course with Parts 1 and 2 in the first semester, and Parts 3 and 4 in the second semester. Also, I have taught the entire book in a fast-paced, first-semester graduate course intended to introduce the fundamentals of aerodynamics to new graduate students who have not had this material as part of their undergraduate education. The book works well in such a mode.

I would like to thank the McGraw-Hill editorial and production staff for the excellent help in producing this book, especially Katie White in Boston, and April Southwood in Dubuque. Also, special thanks go to my long-time friend and associate, Sue Cunningham, whose expertise as a scientific typist is beyond comparison, and who has typed all my book manuscripts for me, including this one, with great care and precision.

I also thank the following reviewers for their valuable feedback: Roger L. Simpson, Virginia Polytechnic Institute and State University; Narayanan Komerath, Georgia Institute of Technology; Ramkumar N. Parthasarathy, University of Oklahoma; and Anastasios S. Lyrintzis, Purdue University.

As a final comment, aerodynamics is a subject of intellectual beauty, composed and drawn by many great minds over the centuries. *Fundamentals of Aerodynamics* is intended to portray and convey this beauty. Do you feel challenged and interested by these thoughts? If so, then read on, and enjoy!

John D. Anderson, Jr.