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Book Review

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Fundamentals of Aerodynamics

John D. Anderson, Jr., 5th ed., McGraw–Hill, New York, 2010, 1106 pp., $195.31.

DOI:

As the author of the book nicely put it, "aerodynamics is a subject of intellectual beauty, composed and drawn by many great minds over the centuries" [1]. In addition to a brief review of the fundamental principles and equations in chapters 1 and 2, the book consists mainly of three parts: inviscid incompressible flow (chapters 3–6), inviscid compressible flow (chapters 7–14), and viscous flow (chapters 15–20). *Fundamentals of Aerodynamics*, now in its fifth edition, can be used as a text for a two-semester course in aerodynamics for college juniors and seniors in aerospace or mechanical engineering. Based on my personal experience in teaching undergraduate aerodynamics, I agree with the author in teaching inviscid incompressible flow during the first semester and inviscid compressible flow and viscous flow during the second semester.

The book promotes learning by laying a solid foundation and then building on that foundation. The author reinforced his message with numerous helpful examples and several illustrations that should help the reader to grasp the aerodynamics concepts and principles. Several new sections, many new worked examples, and additional homework problems are added in the latest edition of the book. There are several excellent undergraduate aerodynamics textbooks on the market [2–5]. I find *Fundamentals of Aerodynamics* to be readable, easy to follow, and very comprehensive.

The author has done an excellent job of organization. The equations are presented systematically, and a step-by-step procedure is followed in derivation of these equations. In this regard, the book would be an excellent source for beginners. In the first part of the book, significant time is spent on potential flow theory and its application to the prediction of lift and induced drag. The procedures for the computation of the lift of an airfoil using the vortex panel method and the lift of a finite wing via the Prandtl lifting line theory have been clearly outlined. However, no computer codes are provided. Addition of MATLAB® codes for solving some interesting application problems would be very useful as a teaching tool. In addition to a brief review of inviscid compressible flow, the second part of the book covers linearized compressible flow, subsonic and supersonic, over airfoils. A chapter is also devoted to hypersonic flow. The third part of the book covers the viscous flow. Some of the topics discussed in this part are Couette flow, laminar and turbulent boundary layers, and the numerical solution of the Navier–Stokes equations. A brief description of the flow instabilities, the transition from laminar to turbulent flow, and a general description of turbulent flows would be a valuable addition to this part of the book.

In summary, I enjoyed reading *Fundamentals of Aerodynamics* and I highly recommend it. I have adopted this book as a required text for the aerodynamics course I am teaching next year.

References

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