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## **Introduction to Aeronautics: a Design Perspective - Third edition**

### **S.A. Brandt**

*American Institute of Aeronautics and Astronautics 1801 Alexander Bell Drive Suite 500 Reston, VA 20191 - 4344 USA. 2015. xxiii 634pp Illustrated. \$109.95. ISBN 978-1-62410-264-6*

This is the third edition of the book by SA Brandt. The two previous editions were very successful in introducing aeronautics from a design perspective. Apart from providing an excellent update to the previous edition, new features have been incorporated, for instance, methods for stealth design or sizing techniques for solar aircraft. Being initially directed to cadets in US Air Force Academy, is very relevant indeed for year-one undergraduate students at universities and colleges, or anyone with little or no background on the subject as it is a notable introduction to the subject.

The book is structured in self-contained chapters including problems and design-oriented exercises. References are provided at the end of each chapter. A particularly useful feature for students is the summary at the end of chapters or sections. These summaries are very schematic, graphical and emphasize equations or data of special interest.

Chapter 1 is a good introduction to aeroplane design, its phases and, provides a brief history of aircraft design. Chapter 2 deals with the operating environment, addressing basic concepts as units, pressure measurement, pressure and the standard atmosphere. This second chapter is interesting for someone that

lacks essential background. Chapter 3 presents aerodynamics concepts. Again, this is started in a basic level to build up gradually to more advanced concepts for the design of the aircraft. Chapter four presents wing design and aerofoil selection procedures. Whole aircraft lift curves and drag polar are presented. The chapter progresses into interesting design topics such as strakes and leading-edge extensions for military aircraft. Comprehensive introduction to supersonic flight regime is also introduced.

Chapter 5 is about performance. It starts with the aircraft motion equations followed by a description of propulsion systems (piston, turbofan, turboprops, ramjet, etc.) with details of the selection process based on power curves and curve shifts. Range and endurance equations are explained and the altitude varying effects are described. Chapter 6 on stability and control introduces aircraft trim, longitudinal stability, neutral point, and lateral stability amongst others. The chapter is an excellent introduction to stability and control concepts. These are explained carefully. This is especially relevant for undergraduates looking at the topic for the first time. The different cases are supported by pertinent illustrations.

Chapter 7 does not assumed anything on aerospace structures and starts introducing the basic concepts in solid mechanics such as stress, failure, plasticity or fatigue. The determination of loads and planning of the aircraft layout are well explained as is the material selection section. The chapter continues with V-n diagrams and type of loading to account for the actions of gust, turbulence, etc. Chapter 9 is dedicated to sizing providing the equations for weight calculation of the different aircraft components. Chapter

10 presents a number of study cases very valuable to review and understand the design process.

The book is an excellent asset for any newly arrived student to the subject of aerospace design and may be really useful as an initial textbook for introduction to aeronautics on year one of aerospace engineering university degrees.

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