Aircraft Aerodynamic Design: Geometry and Optimization

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This is a good introduction to the current status of design and optimisation of aircraft geometries and reading this book would allow the non-specialist engineer to understand the topic.

The book is logically laid out, and after some introductory comments starts with a chapter on geometry parameterisation. This chapter ends with an overview of a propulsion integration study, which provides a good illustration of why the optimisation process is potentially useful. The following two chapters on generating curves and surfaces would be enough to make the eyes of many engineers glaze over, but it is here that the strength of the book is introduced – computer codes in either MATLAB or Python. The codes, which can be downloaded from the publisher's website, allow the reader to understand the theory by 'playing around' with input values to see how the generated curves and surfaces change.

Codes are an integral part of the following chapters as the reader is led through aerofoil and wing planform parameterisation to the design of a realistic three-dimensional wing.

The book finishes with two case studies. The first is a worked example on aerofoil analysis and the second considers the aerodynamic shape optimisation of a human-powered aircraft. Example computer codes are included with these case studies.

Prior to the discussion of aerofoil parameterisation, there is a reminder of some fundamental ideas relating to aerofoils, along with a review of the use of legacy aerofoils such as the NACA 4 digit series. A similar section on fundamental ideas relating to wing planform precedes the discussion on planform parameterisation. These sections allow the authors to identify possible parameters for use in optimisation studies, whilst at the same time indicating practical limits to the values of these parameters.

The book is generally well written and easy to read, with a pleasing use of aircraft photographs to illustrate the text.

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