Preface to the second edition

It is ten years since this book was first published and during that time there has been a modest but steady demand for the book. It is apparent that during this period there has been a growing recognition in academic circles that it is more appropriate to teach "Aircraft stability and control" in a systems context, rather than the traditional aerodynamic context and this is a view endorsed by industry. This is no doubt due to the considerable increase in application of automatic flight control to all types of aircraft and to the ready availability of excellent computer tools for handling the otherwise complex calculations. Thus the relevance of the book is justified and this has been endorsed by positive feedback from readers all over the world.

The publisher was clearly of the same opinion, and a second edition was proposed. It is evident that the book has become required reading for many undergraduate taught courses, but that its original emphasis is not ideal for undergraduate teaching. In particular, the lack of examples for students to work was regarded as an omission too far. Consequently, the primary aim of the second edition is to support more generally the requirement of the average undergraduate taught course. Thus it is hoped that the new edition will appeal more widely to students undertaking courses in aeronautical and aeronautical systems engineering at all levels.

The original concept for the book seems to have worked well, so the changes are few. Readers familiar with the book will be aware of rather too many minor errors in the first edition, arising mainly from editing problems in the production process. These have been purged from the second edition and it is hoped that not so many new errors have been introduced. Apart from editing here and there, the most obvious additions are a versatile computer programme for calculating aircraft trim, the introduction of material dealing with the inter-changeability of the North American notation, new material on lateral-directional control derivatives and examples for students at the end of most chapters. Once again, the planned chapter on atmospheric disturbance modelling has been omitted due to time constraints. However, an entirely new chapter on Coursework Studies for students has been added.

It is the opinion of the author that, at postgraduate level in particular, the assessment of students by means of written examinations tends to trivialise the subject by reducing problems to exercises which can be solved in a few minutes – the real world is not often like that. Consequently, traditional examining was abandoned by the author sometime ago in favour of more realistic, and hence protracted coursework studies. Each exercise is carefully structured to take the student step by step through the solution of a more expansive flight dynamics problem, usually based on real aircraft data. Thus, instead of the short sharp memory test, student assessment becomes an extension and consolidation of the learning process, and equips students with the

essential enabling skills appreciated by industry. Feedback from students is generally very positive and it appears they genuinely enjoy a realistic challenge.

For those who are examined by traditional methods, examples are included at the end of most chapters. These examples are taken from earlier Cranfield University exam papers set by the author, and from more recent exam papers set and kindly provided by Dr Peter Render of Loughborough University. The reader should not assume that chapters without such examples appended are not examinable. Ready made questions were simply not available in the very tight time scale applying.

In the last ten years there has been explosive growth in unmanned air vehicle (UAV) technology, and vehicles of every type, size and configuration have made headlines on a regular basis. At the simplest level of involvement in UAV technology, many university courses now introduce experimental flight dynamics based on low cost radio controlled model technology. The theoretical principles governing the flight dynamics of such vehicles remain unchanged and the material content of this book is equally applicable to all UAVs. The only irrelevant material is that concerning piloted aircraft handling qualities since UAVs are, by definition, pilotless. However, the flying qualities of UAVs are just as important as they are for piloted aircraft although envelope boundaries may not be quite the same, they will be equally demanding. Thus the theory, tools and techniques described in this book may be applied without modification to the analysis of the linear flight dynamics of UAVs.

The intended audience remains unchanged, that is undergraduate and post graduate students studying aeronautical subjects and students studying avionics, systems engineering, control engineering, mathematics, etc. with aeronautical application in mind. In view of the take up by the aerospace industry, it is perhaps appropriate to add, young engineers involved in flight dynamics, flight control and flight test, to the potential readership. It is also appropriate to reiterate that the book is introductory in its scope and is intended for those coming to the subject for the first time. Most importantly, in an increasingly automated world the principal objective of the book remains to provide a secure foundation from which to move on into non-linear flight dynamics, simulation and advanced flight control.

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