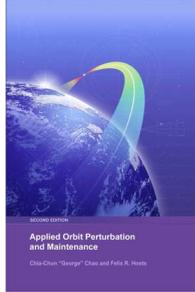


essays that, mostly, address a topic of great importance in all its aspects. Although green aviation is a field in which both the science and technology are steadily advancing, it should serve as an important source for workers in the field for years to come.

J. E. Green, FREng, FRAeS, FAIAA



Applied Orbit Perturbation and Maintenance – Second edition

C-C. Chao and F. R. Hoots

American Institute of Aeronautics and Astronautics, Reston, VA, 2017. Distributed by Transatlantic Publishers Group, 97 Greenham Road London N10 1LN, UK. xviii; 411pp. Illustrated. £97. ISBN 978-1-88498-927-8.

This second edition of *Applied Orbit Perturbation and Maintenance* by Chia-Chun (George) Chao with new inputs from Felix Hoots is a welcome update to an already established astrodynamics text by the primary author.

Building from the fundamental theory of orbit motion through the development of classical elements and complex perturbed trajectories to application to mission analysis problems, the text provides a comprehensive treatise and consideration of appropriate approaches to orbit representation and modelling solutions. The chapters on orbit maintenance of different classical orbits ranging from low-Earth up to higher altitude orbits are particularly useful, most notably

station-keeping and collocation of geostationary satellites and will prove beneficial to the modeller and operator/analyst alike in providing background rationale for particular operational strategies.

The chapter on the strategies and long-term stability of end of life disposal orbits is very helpful in explaining the need for, and practical implementation of, measures to limit the proliferation of space debris by removing satellites from crowded orbits once a mission is complete. This topic is further elaborated with a dedicated chapter on space debris, explaining the background history and predicted future evolution of the space object population, outlining some models that are available to the practitioner and relevant disposal strategies, in addition to underlining the need for space surveillance and tracking.

Finally, the appendices are a very useful source of orbital theory ranging from third body gravitational perturbation through solar radiation pressure impact and simplified solutions to both conservative and non-conservative force influence on trajectories.

This book is recommended to both undergraduates and postgraduate students and is a very valuable reference for mission designers and those involved in the day-to-day operations of satellites and is an excellent primer for any aspiring astrodynamists.

Richard Crowther, CEng, FRAeS



Aerospace Materials and Material Technologies Vol 2: Aerospace Material Technologies

Edited by N. E. Prasad and R. J. H. Wanhill

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Volume 1, subtitled 'Aerospace Material', was reviewed in *The Aeronautical Journal* May 2018.

Volume 2, subtitled 'Aerospace Materials Technologies' is presented in four Parts: Part 1 – Processing Technologies; Part 2 – Characterisation and Testing; Part 3 – Structural Design; Part 4 – Special Technologies, is the subject of this review.

'Processing of Aerospace Metals and Alloys: Part 1 – Special Melting Technologies' – Chapter 1 – starts at the ingot stage where Electric Magnetic Vacuum Induction Melting (VIM and Post VIM) are processes recommended as the surest way of transforming raw metal bulk into near flawless high grade material stock (see Chapter 2).