This book brings together contributions from thirteen leading experts in the subject from all over the world and forms the second half of a pair of books, the first being *Bistatic Radar: Principles and Practice* published by Wiley in 2007. Dr Cherniakov, who leads a group at the University of Birmingham which has done pioneering work in this field, is well qualified to edit these books.

The book is organised in ten chapters. Emphasis is given to two principal aspects of the subject: bistatic synthetic aperture radar and passive bistatic radar. The first of these allows the formation of high-resolution radar images from aircraft-borne or satellite-borne platforms; the second exploits signals from broadcast, communications or radionavigation transmissions, giving in effect a passive, completely covert radar system, that is also able to use parts of the electromagnetic spectrum (such as VHF or UHF) not usually available for radar applications.

The style of the book is clear and authoritative, with an appropriate level of mathematical detail and excellent use of diagrams to explain complicated concepts. Since it contains a wealth of new information, new results from practical systems and a large number of up-to-date references, the book will be of great value to researchers in this subject in university and industrial laboratories.

Professor H.D. Griffiths, FREng, FIET, FIEEE

Atmospheric and Space Flight Dynamics: Modeling and Simulation with MATLAB and Simulink

A. Tewari

Birkhauser Verlag, Viaduktstrasse 42, CH-4051 Basel, Switzerland. 2007. 556pp. £60. ISBN 978-0-8176-4437-6.

This book is remarkable due to its coverage, both in topics and levels, of the many fields indicated by the title.

Chapter 1 is an introduction whilst Chapter 2 covers kinematics expressed in conventional vector and matrix forms. It also deals with the Gibbs vector and quaternions. Chapter 3 is a brief introduction to gravity and non-spherical planetary shapes. Chapter 4 deals with the basic Newtonian dynamics of particles, groups of particles and, in particular, two-body problems. Chapter 5 takes the reader into orbital mechanics and Chapter 6 deals with perturbed orbits. Chapter 7 covers the classical three body problem ending with the numerical solution of the restricted problem. Chapter 8 deals with rocket propulsion for multi-stage and optimal rockets.

The book now continues with discussion of the properties of the atmosphere and moves on to concepts of aerodynamics. The next topic is air-breathing propulsion from propeller driven to scramjets. This now leads on to trans-atmospheric trajectories, which is regarded as the heart of the book. Chapter 13 is devoted to rigid body dynamics and its application to attitude dynamics. The last two chapters cover attitude control systems followed by advanced numerical modelling.

There are many worked examples and applications of MATLAB and Simulink to help give practicality to the theory. It is not possible to verify all the equations, almost 400, but the final results appear to be accurate. However, there are just a few ambiguities in the use of symbols and terminology. Also the verbal description of the physics involved is not always as expected, especially in the field of aerodynamics.

Overall it is a book worth reading as it draws together most of the topics relevant to spaceflight.

Dr H. Ron Harrison, CEng, FRAeS

Materials and Process Selection for Engineering Design – Second edition

M.M. Farag

CRC Press, Taylor and Francis Group, 2 Park Square, Milton Park, Abingdon, Oxon, OX14 4RN, UK. 2008. 432pp. Illustrated. £34.99. ISBN 1-4200-6308-1.

Dr Farag introduces his subject by first describing the organisational aspects of product design and development – an activity he sees as a formal decision making process. Vertical and horizontal (lateral thinking) is implied throughout but the iterative nature of design is not apparent.

Having set the scene in Chapter 1, the main text is presented in four quite separate parts: I Performance of Materials in Service; II Relationship Between Design, Materials and Manufacturing Processes; III Selection and Substitution of Materials in Industry; IV Appendices A, B and C.

The author assumes that readers have completed a first course in Materials Science but a consistent academic level is not maintained. To take but one instance: How many teachers of this subject would attempt to kick-start an elementary text by quoting the Griffith plane stress equation for 'glass'? Quite apart from the fact that calculating the surface energy lies beyond the immediate scope of the likely reader, the introduction of stress intensity factors K1 and Kc, four chapters ahead of the most basic (P over A) stress calculations, (in Chapter 6), is surely premature.

Chapter 3 – headed 'Environmental Degradation' – is not about degradation of the external environment per se, but about the corrosion, oxidation and abrasive wear of metals. Had the ins and outs of the Waste Electronic and Electrical Equipment Directive (WEEE), the Restriction of Hazardous Substances Directive (RoHS), and the Energy using Products Directive (EuP) been considered, the Chapter would have been correctly titled, but this is not to say a knowledge of corrosion, oxidation and abrasive wear is unimportant.

Chapter 4 'Selection of Materials to Resist Failure' touches on topics normally studied at first year level. The chapter contains numerous data tables which relate to common materials and their uses. The use of Performance Indices forms an important part of this chapter, but these are presented without proof and many readers will not have a clue: why it's S (for strength) in tension, $S^{2/3}$ in torsion, $S^{1/2}$ for a flat plate in bending or why it's $\pi^{1/2}$ in one equation and $\pi^{1/3}$ in another.

It has to be said that Part II is simplistic, and for the reviewer, disappointing. The most worthy part of Chapter 5 – 'The Nature of Engineering Design' – is a flow chart and supporting comment which shows design to be an interactive process, but few very basic numerical examples do not explain the true nature and aims of design. Chapter 6 – 'Effect of Material Properties on Design' – contains some useful data tables and closely related guidelines. Chapter 7 – 'Effect of Manufacturing Processes on Design' – amounts to little more than what a junior craft apprentice would have known as basic workshop technology and practice, some 50 years ago. The Index does contain a single entry for CAD/CAM systems, but CNC machining, rapid profiling, robots, flow visualisation (used in casting, forging and extrusion), all important topics, are not mentioned here.

Part III – 'Selection and Substitution of Materials in Industry' – begins at Chapter 8 and puts the author on firmer ground. The author's objective is to review ways of optimising priorities associated with what he calls custom made components. These, we are told, are components for which the cost distribution is approximately: 5% design, 50% materials, 15% labour, 30% overheads – a distribution which clearly excludes the manufacture of a watch and a military battle tank from the discussion. Material cost from ore preparation to final product is explained in detail. One graph

https://doi.org/10.1017/S000192400008790X Published online by Cambridge University Press