explored. Bayesian reasoning is indicated as a way to model knowledge and conflict, and it is shown that, by using Bayesian logic, quantifiable SA can be generated.

Chapter 8 provides an overview of EW system elements relevant to this book's consideration of IW and CEW and references are provided for those desiring further detail. EW system architectures are discussed, with focus on RF receiving and jamming systems, and operational considerations are commented upon. Chapter 9 contains theoretical analyses of EW system performance, based on information theory principles introduced in Chapter 3. Five CEW scenarios are discussed and some EW system performance measures, in ES and EA modes separately and together, are examined using a number of approaches. The scenarios are viewed by Poisel as typical use of tactical EW systems countering target communication networks. He also notes the results apply equally to ground-to-ground, air-to-air and air-to-ground situations. Chapter 10 presents the results of EW architecture simulations. The engineering performance is first analysed by computer simulation then the results are presented for two operational scenarios – North-East Asia and urban terrain. Appendix A illustrates the specific networks simulated.

To increase military conflict success probability, many nations are moving from distributed land, sea, air and space platforms towards fully integrated, network-enabled capabilities. This book appears a worthwhile reference against this background and the increasingly complex, congested and conflicted electromagnetic spectrum. It is likely to be useful for IW/IO and EW engineers working across these domains and should help engineers and researchers better understand the technical aspects of integrated IW/IO/EW capability.

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Spacecraft Dynamics and Control: an Introduction

A. H. J. de Ruiter *et al*

John Wiley and Sons, The Atrium, Southern Gate, Chichester, West Sussex, PO19 8SQ, UK. 2013. 569pp. Illustrated. £62.95. ISBN 978-1-118-34236-7.

This book provides an introduction to the field of dynamics and control of spacecraft. The book is organised in 26 chapters detailing elementary kinematics and kinetics (1-2), orbital dynamics (3-10), spacecraft attitude control (11-17), classical control theory (18-23) and then further topics in spacecraft control including nonlinear control, navigation and practical design issues (24-26). The book examines a wide range of topics that an undergraduate would need to know to start designing control systems for spacecraft.

In terms of the astrodynamics chapters, the book provides details ranging from the two-body problem to the restricted three-body problem including discussion on orbital manoeuvres and interplanetary trajectories. The notation used for equations is clear and well thought out. Diagrams are however highly minimalist and lack the depth or rigour of prominent texts such as Vallado *Fundamentals of Astrodynamics and Applications* (McGraw-Hill, 1997) where significant effort has been made to make the diagrams full of useful information, yet clear to understand.

The book presents several chapters on classical controls. Whilst the book provides a good overview of these techniques (root locus, bode plots, time and frequency analysis), the book seems to lack sufficient examples for students to fully understand the content. The book is also significantly lacking any problems to work through. In comparison, many core controls texts provide much greater grounding in the subject, such as Franklin, Powell and Emami-Naeini (FPE) – *Feedback Control of Dynamic Systems* (the source of several of their chapters). For example, the root locus design chapter of FPE, provides at least 12 worked examples of the design process followed by 48 practise problems for students thereby providing a better learning source for students.

In terms of organisation, it would have also helped if chapters had been grouped together into subsets for clarity e.g. Part A: Dynamics and Astrodynamics, Part B: Classical Controls, Part C: Spacecraft Attitude Control etc. Without these parts, the separation between the chapters is confusing on first glance.

In conclusion, this book covers a broad range of areas – including some more in-depth content (stabilisation techniques, practical design issues) – and is best used as an introductory text to the field for latter year undergraduates.

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Deep Space Propulsion: a Roadmap to Interstellar Flight

K. F. Long

Springer. 2012. 367pp. Illustrated. £31.99. ISBN 978-1-46140606-8.

This is a readable, insightful and personal history of interstellar travel thinking with a focus on propulsion ('the author favours the nuclear pulse', page x).

The history takes us from Aviation to possible solutions that Long hopes will progress us to 'thinking of your own ideas for how machines can be propelled across the vastness of space' (page ix).To help with this aim, each chapter has an 'Introduction' providing a short overview of the chapter while the 'practice exercises' at the end are to stimulate discussion.

The book turns into a politely engaged argument that we as a society should support long term engineering and interstellar projects. The central suggestion is 'The Alpha Centauri Prize...to be held every four years. This would allow sufficient time between design studies so as to allow some technological and scientific discoveries' (page 319). At present, this is a very optimistic timescale for this type of engineering. In fact at least since Project Daedalus, some form of nuclear propulsion has been regarded as the technology needed for interstellar missions while actual technology status has faded away. Long is aware of this and argues for a gradual return to nuclear developments as well as for a Pathfinder 'technology demonstrator mission to 1,000AU (Astronomical Unit), the outermost location of the solar gravitational lensing point'(page 318).

Since at least 1987 Claudio Maccone has made such a mission a priority due to its importance to detect weak radio signals from possible intelligences. The effect is estimated to begin at 550AU but even that distance would be a challenge at present. The Kuiper Belt for example is 'only' at 40 to 100AU. In fact Claudio Maccone in 2009 predicted a focus for gravitational waves and neutrinos at 22,45 to 29,59AU (that is somewhere between the orbits of Uranus and Neptune).This prediction with the increasing instrumentation for neutrino astronomy could perhaps be a mission for the more near term.

Long discusses the gravitational lens mission (page 311) and follows it up with three' Challenger Missions' ie. 150-200AU launched 2015-2020; 200-600AU launched 2025-2030; 1,000AU launched 2030-2040.

However, 'the year 2050 for the first star mission seems quite ambitious. Let us think about a scenario that leads to the first launch by the year 2100' (page 321).This illustrates well the problem with any interstellar flight planning: our present society lacks the intellectual and financial