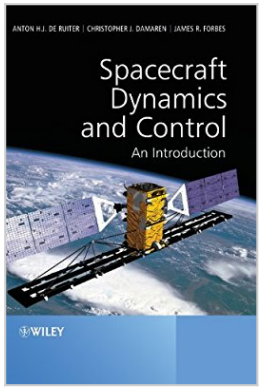

Spacecraft Dynamics and Control: An Introduction

By Anton H. de Ruiter, Christopher Damaren, James R. Forbes

Spacecraft Dynamics and Control: An Introduction By Anton H. de Ruiter, Christopher Damaren, James R. Forbes

Provides the basics of spacecraft orbital dynamics plus attitude dynamics and control, using vectrix notation

Spacecraft Dynamics and Control: An Introduction presents the fundamentals of classical control in the context of spacecraft attitude control. This approach is particularly beneficial for the training of students in both of the subjects of classical control as well as its application to spacecraft attitude control. By using a physical system (a spacecraft) that the reader can visualize (rather than arbitrary transfer functions), it is easier to grasp the motivation for why topics in control theory are important, as well as the theory behind them. The entire treatment of both orbital and attitude dynamics makes use of vectrix notation, which is a tool that allows the user to write down any vector equation of motion without consideration of a reference frame. This is particularly suited to the treatment of multiple reference frames. Vectrix notation also makes a very clear distinction between a physical vector and its coordinate representation in a reference frame. This is very important in spacecraft dynamics and control problems, where often multiple coordinate representations are used (in different reference frames) for the same physical vector.

- Provides an accessible, practical aid for teaching and self-study with a layout enabling a fundamental understanding of the subject
- Fills a gap in the existing literature by providing an analytical toolbox offering the reader a lasting, rigorous methodology for approaching vector mechanics, a key element vital to new graduates and practicing engineers alike
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- Contains numerous illustrations to accompany the written text. Problems are included to apply and extend the material in each chapter

Essential reading for graduate level aerospace engineering students, aerospace professionals, researchers and engineers.

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Editorial Review

Review

“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.” (*The Aeronautical Journal*, 1 November 2014)

“Overall, this book provides a good, comprehensive examination of the fundamentals of translational and rotational dynamics, determination, and control of spacecraft. Summing Up: Recommended. All academic and professional aerospace engineering collections.” (*Choice*, 1 September 2013)

From the Back Cover

"This unique volume is unmatched in breadth and depth, providing detailed coverage of topics ranging from orbital dynamics to formation flight to attitude dynamics to control and navigation. The authors bring a fresh, unified perspective to the field with a groundbreaking textbook that is destined to become the favorite of students at all levels."—**Dennis S. Bernstein, Aerospace Engineering Department, The University of Michigan, USA**

This textbook presents a rigorous, yet practical and accessible introduction to the fundamentals of spacecraft dynamics and control. Written for engineering students and practicing engineers with a basic background in mathematics and mechanics, it is suitable for both upper-year undergraduate courses and first graduate courses, as well as self study. The material covered is comprehensive; all the pertinent aspects of a spacecraft mission including orbital dynamics, attitude dynamics, and control are discussed. Additionally, advanced topics such as low-thrust trajectory analysis, nonlinear spacecraft attitude control, and navigation techniques are introduced. A unique feature of this textbook is the presentation of classical control systems design techniques using spacecraft attitude control as the motivating control design objective.

Key features:

- A comprehensive reference on the fundamentals of orbital dynamics, attitude dynamics, and control
- Classical control systems design is explained and motivated by the control of a spacecraft's attitude
- Practical aspects of spacecraft dynamics and control are discussed, included sensor and actuator operation, digital implementation of controllers, and the effects of unmodelled dynamics
- Numerous illustrations accompany the text, helping the reader to better understand the material

Users Review

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