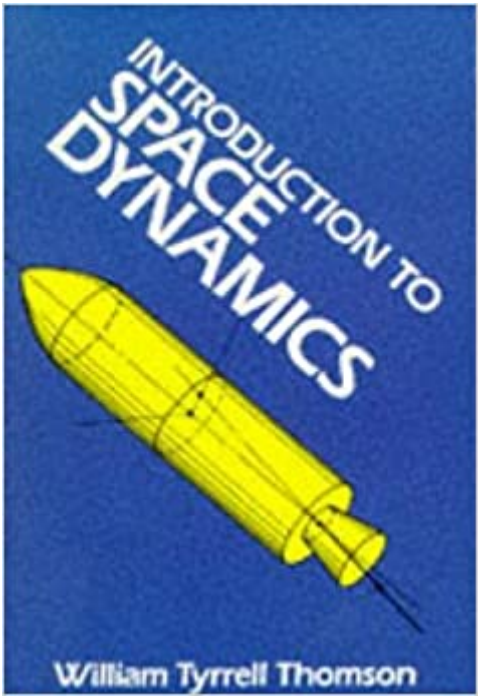
Introduction To Space Dynamics (Dover Books On Aeronautical Engineering)



Synopsis

Although this classic introduction to space-flight engineering was first published not long after Sputnik was launched, the fundamental principles it elucidates are as varied today as then. The problems to which these principles are applied have changed, and the widespread use of computers has accelerated problem-solving techniques, but this book is still a valuable basic text for advanced undergraduate and graduate students of aerospace engineering.The first two chapters cover vector algebra and kinematics, including angular velocity vector, tangential and normal components, and the general case of space motion. The third chapter deals with the transformation of coordinates, with sections of Euler's angles, and the transformation of angular velocities.A variety of interesting problems regarding the motion of satellites and other space vehicles is discussed in Chapter 4, which includes the two-body problem, orbital change due to impulsive thrust, long-range ballistic trajectories, and the effect of the Earth's oblateness. The fifth and sixth chapters describe gyrodynamics and the dynamics of gyroscopic instruments, covering such topics as the displacement of a rigid body, precession and nutation of the Earth's polar axis, oscillation of the gyrocompass, and inertial navigation.Chapter 7 is an examination of space vehicle motion, with analyses of general equations in body conditions and their transformation to inertial coordinates, attitude drift of space vehicles, and variable mass. The eighth chapter discusses optimization of the performance of single-stage and multistage rockets. Chapter 9 deals with generalized theories of mechanics, including holonomic and non-holonomic systems, Lagrange's Equation for impulsive forces, and missile dynamics analysis.Throughout this clear, comprehensive text, practice problems (with answers to many) aid the student in mastering analytic techniques, and numerous charts and diagrams reinforce each lesson. 1961 edition.

Book Information

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Customer Reviews

"Introduction to Space Dynamics" by William Tyrrell ThomsonOverall, this is a classic and essential book for those serious about astrodynamics and understanding space systems. The text is a great introduction to a broad set of categories in space dynamics including both rocket and satellite systems. In my opinion, it is appropriate for a undergraduate text in aerospace engineering or perhaps a graduate text for other engineering or science disciplines that are interested in space. Requirements for following the book are a good understanding of calculus and linear algebra and some exposure at least to concepts and notation in kinematics/mechanics/etc.Chapters 1-3 are introductory chapters on prerequisite material for the remaining chapters. These cover basic vector mathematics, kinematics, and reference coordinate frames and the transformation between frames.Chapter 4 covers particle mechanics in space (basic astrodynamics). This includes basic satellite orbits unpowered and powered. This section is a really good introduction to perturbation of orbital parameters, ballistic trajectories, effects of Earth's oblateness, and rendezvous problems.Chapters 5 and 6 is a serious treatment of gyrodynamics and gyro instruments that the author devotes 92 pages to cover.Chapter 7 covers non-particle spacecraft dynamics. This includes spacecraft attitude problems, and an introduction to the basics of guidance, navigation, and control.Chapter 8 covers rocket performance and optimization techniques including staging and trajectory optimization.The final chapter, Chapter 9, introduces the reader to the generalized theories of mechanics (Hamiltonian and Lagrangian mechanics). This is also known as advanced dynamics."Introduction to Space Dynamics" makes a great reference for space industry professionals and anyone interested in knowing more about space systems. The text can be used (and often is used) to develop computational tools for solving more sophisticated problems in space dynamics. This text also complements some of the other great texts in these areas such asÃ Â Fundamentals of Astrodynamics (Dover Books on Aeronautical Engineering)Ã Â by Bate, Mueller, and White (for orbital mechanics),Ã Â Spacecraft Attitude Dynamics (Dover Books on Aeronautical Engineering)Ã Â by Hughes (for attitude dynamics),Ã Â Space Vehicle Dynamics and Control (AIAA Education)Ã Â by Wie (for controls), andÃ Â Space Propulsion Analysis and DesignÃ Â by Humble (for rocket and spacecraft propulsion).

This book is great but it deserve 5 stars if it is containing more examples and at least the final answers of listed problems .the problems are without solutions

I just love this book. I've even bought it for friends. Lots of math so be prepared.I read this because I was curious about space navigation and orbits. I had no idea how much I would learn from it. Thanks! It was well worth the effort to work through this meaty book.

A classic, but a bit dated and only goes into basic orbital maneuvers.

Good book on basic space dynamics (1960/1980s). Gyro subject is strictly inertia mechanical, but that's ok.

This is a great book on dynamics. It is my go-to reference when I need to look something up or refresh my memory. It's very well written and a great bargain.

It came. It saw. It rekt my life with its complexity. Would read again.

Diagrams 1 mm wideWithout, text is worthless

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