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Select Proceedings of TEMT 2019
Introduction to Astrodynamic Reentry
Proceedings of 1st International Conference on Small Satellites
Atmospheric Re-Entry Vehicle Mechanics
Atmospheric and Space Flight Dynamics
Dynamics of Atmospheric Re-Entry
Hypersonic Vehicles
Atmospheric Re-Entry Vehicle Mechanics
Advanced Control of Aircraft, Spacecraft and Rockets
The Legacy of the White Oak Laboratory
Mars Exploration
Proceedings of the US/European Celestial Mechanics Workshop, held in Poznań, Poland, 3–7 July 2000
Models and Risk Analysis
Re-entry and Planetary Entry Physics and Technology
Modeling and Simulation with MATLAB® and Simulink®
Proceedings of the International Conference on Aerospace System Science and Engineering 2019
Fundamentals of Spacecraft Attitude Determination and Control
Re-entry and Planetary Entry Physics and Technology

Past, Present and Future Developments

KARLEE WILSON

Selected Aerothermodynamic Design Problems of Hypersonic Flight Vehicles Springer Nature
Orbital Mechanics for Engineering Students, Second Edition, provides an introduction to the basic concepts of space mechanics. These include vector kinematics in three dimensions; Newton's laws of motion and gravitation; relative motion; the vector-based solution of the classical two-body problem; derivation of Kepler's equations; orbits in three dimensions; preliminary orbit determination; and orbital maneuvers. The book also covers relative motion and the two-impulse rendezvous problem; interplanetary mission design using patched conics; rigid-body dynamics used to characterize the attitude of a space vehicle; satellite attitude dynamics; and the characteristics and design of multi-stage launch vehicles. Each chapter begins with an outline of key concepts and concludes with problems that are based on the material covered. This text is written for undergraduates who are studying orbital mechanics for the first time and have completed courses in physics, dynamics, and mathematics, including differential equations and applied linear algebra. Graduate students, researchers, and experienced practitioners will also find useful review materials in the book. NEW: Reorganized and improved discusions of coordinate systems, new discussion on perturbations and quarternions NEW: Increased coverage of attitude dynamics, including new Matlab algorithms and examples in chapter 10 New examples and homework problems
Re-entry Vehicle Dynamics John Wiley & Sons
This book presents the proceedings of the International Conference on Aerospace System Science and Engineering (ICASSE 2019), held in Toronto, Canada, on July 30–August 1, 2019, and jointly organized by the University of Toronto Institute for Aerospace Studies (UTIAS) and the Shanghai Jiao Tong University School of Aeronautics and Astronautics. ICASSE 2019 provided a forum that brought together experts on aeronautics and astronautics to share new ideas and findings. These proceedings present high-quality contributions in the areas of aerospace system science and engineering, including topics such as trans-space vehicle system design and integration, air vehicle systems, space vehicle systems, near-space vehicle systems, aerospace robotics and unmanned systems, communication, navigation and surveillance, aerodynamics and aircraft design, dynamics and control, aerospace propulsion, avionics systems, optoelectronic systems, and air traffic management.
Space Vehicle Design Trans Tech Publications Ltd
Themechanicsofspace?ightisan olddiscipline.Itstopicoriginallywasthemotion of planets, moons and other celestial bodies in gravitational ?elds. Kepler's (1571 - 1630) observations and measurements have led to probably the ?rst mathematical description of planet's motion. Newton (1642 - 1727) gave then, with the devel- ment of his principles of mechanics, the physical explanation of these motions. Since then man has started in the second half of the 20th centuryto capture ph- ically the Space in the sense that he did develop arti?cial celestial bodies, which he brought into Earth's orbits, like satellites or space stations, or which he did send to planets or moons of our planetary system, like probes, or by which p- ple were brought to the moon and back, like capsules. Further he developed an advanced space transportation system, the U.S. Space Shuttle Orbiter, which is the only winged space vehicle ever in operation. In the last two and a half decades there were several activities in the world in order to succeed the U.S. Orbiter, like the HERMES project in Europe, the HOPE project in Japan, the X-33, X-34 and X-37 studies and demonstrators in the United States and the joint U.S. - European project X-38. However, all these projects were cancelled. The motion of these vehicles can be described by Newton's equation of motion.
An Introductory Text Springer
This volume contains papers presented at the US/European Celestial Mecha nics Workshop organized by the Astronomical Observatory of Adam Mickiewicz University in Poznan, Poland and held in Poznan, from 3 to 7 July 2000. The purpose of the workshop was to identify future research in celestial mech anics and encourage collaboration among scientists from eastem and westem coun tries. There was a full program of invited and contributed presentations on selected subjects and each day ended with a discussion period on a general subject in celestial mechanics. The discussion topics and the leaders were: Resonances and Chaos-A. Morbidelli; Artificial Satellite Orbits-K. T. Alfriend; Near Earth Ob jects - K. Muinonen; Small Solar System Bodies - I. Williams; and Summary - P. K. Seidelmann. The goal of the discussions was to identify what we did not know and how we might further our knowledge. The size of the meeting and the language differences somewhat limited the real discussion, but, due to the excellence of the different discussion leaders, each of these sessions was very interesting and productive. Celestial Mechanics and Astrometry are both small fields within the general subject of Astronomy. There is also an overlap and relationship between these fields and Astrodynamics. The amount of interaction depends on the interest and efforts of individual scientists.
Safety Design for Space Operations Springer Science & Business Media
Dynamics of Atmospheric Re-EntryAIAAAtmospheric Re-Entry Vehicle MechanicsSpringer Science & Business Media
II / Advanced Concepts, Experiments, Guidance-Control and Technology Springer Science & Business Media
Based on a long engineering experience, this book offers a comprehensive and state-of-the-art analysis of aerodynamic and flight mechanic entry topics. This updated edition had new chapters on Re-entry on Mars mission, flight quality, rarefied aerodynamics and re-entry accuracy. In addition, it provides a large set of application exercises and solutions.
Advances in Small Satellite Technologies Springer Science & Business Media
The future evolution of the debris environment will be forecast on the basis of traffic models and possible hazard mitigation practices. The text shows how large trackable objects will have re-entry pinpointed and predictions made on related risk assessment for possible ground impact. Models will also be described for meteoroids which are also a prevailing risk.
Steady Glide Dynamics and Guidance of Hypersonic Vehicle Amer Inst of Aeronautics &
In the aviation field there is great interest in high-speed vehicle design. Hypersonic vehicles represent the next frontier of

passenger transportation to and from space. However, several design issues must be addressed, including vehicle aerodynamics and aerothermodynamics, aeroshape design optimization, aerodynamic heating, boundary layer transition, and so on. This book contains valuable contributions focusing on hypervelocity aircraft design. Topics covered include hypersonic aircraft aerodynamic and aerothermodynamic design, especially aeroshape design optimization, computational fluid dynamics, and scramjet propulsion. The book also discusses high-speed flow issues and the challenges to achieving the dream of affordable hypersonic travel. It is hoped that the information contained herein will allow for the development of safe and efficient hypersonic vehicles.

Inertial Navigation Systems Analysis Springer Science & Business Media

Updated for 2015, the second edition of Introduction to Astrodynamic Reentry continues my tradition of teaching atmospheric entry from an analytical perspective, with finding closed-form solutions being the preferred approach. The over-arching goal is to instill an understanding of how "families of solutions" behave as well as the general trends, tradeoffs, and nature of atmospheric entry. My approach is to use easily visualized variables to solve the analytical problems first and keep them (more-or-less) consistent as we move to the computer for the harder problems. This is a "back to the basics" approach for a new generation of students who've become more comfortable with numerical solutions than analytical ones. The pages are loaded with equations because I've included the details of most of the derivations. This book pulls together many classical analyses and presents them in a consistent notation for the first time. It provides a convenient starting point for an analytical understanding of atmospheric entry, with plenty of references to those original works. It ties together results that were originally published years apart by different authors. And, peppered throughout, you'll find some new approaches and results.

a Step Forward Simon and Schuster

During the last decade, a rapid growth of knowledge in the field of re-entry and planetary entry has resulted in many significant advances useful to the student, engineer and scientist. The purpose of offering this course is to make available to them these recent significant advances in physics and technology. Accordingly, this course is organized into five parts: Part 1, Entry Dynamics, Thermodynamics, Physics and Radiation; Part 2, Entry Abla tion and Heat Transfer; Part 3, Entry Experimentation; Part 4, Entry Concepts and Technology; and Part 5, Advanced Entry Programs. It is written in such a way so that it may easily be adopted by other universities as a textbook for a two semesters senior or graduate course on the sub ject. In addition to the undersigned who served as the course instructor and wrote Chapters, 1, 2, 3 and 4, guest lecturers included: Prof. FRANKLIN K. MOORE who wrote Chapter 5 "Entry Radiative Transfer," Prof. SHIH-I PAl who wrote Chapter 6 "Entry Radiation-Magnetogasdy namics," Dr. CARL GAZLEY, Jr. who wrote Chapter 7 "Entry Deaccelera tion and Mass Change of an Ablating Body," Dr. SINCLAIRE M. SCALA who wrote Chapter 8 "Entry Heat Transfer and Material Response," Mr.

Nonlinear Dynamics and Stability of Hypersonic Reentry Vehicles Springer Science & Business Media

The main objective for this collection of 80 peer reviewed papers was to provide a platform for researchers, engineers, academicians as well as industrial professionals to present their latest experiences and developments activities in the field of Smart Systems and their Applications in Aerospace, Robotics, Mechanical Engineering, Manufacturing Systems, Biomechatronics and Neurorehabilitation.

Aerodynamic Data of Space Vehicles Elsevier

From the beginning of humankind’s use of space, human-made objects have re-entered the Earth’s atmosphere and experienced the severe aerodynamic heating and loads characteristic of high-speed atmospheric re-entry. Some of these reentries have generated fragments that survived to impact the Earth’s surface and be hazardous to people and damaging to property. This chapter addresses the safety of both broad types of space hardware re-entries: either controlled so impact is targeted in a specific area, or uncontrolled, where re-entry can occur anywhere within the latitude band defined by the orbital inclination of the reentering object. The overall objective of this chapter is to help prepare safety engineers to answer the ultimate questions involved in the design of safety re-entry operations.

OPTIROB 2013 Springer Nature

Advanced Control of Aircraft, Spacecraft and Rockets introduces the reader to the concepts of modern control theory applied to the design and analysis of general flight control systems in a concise and mathematically rigorous style. It presents a comprehensive treatment of both atmospheric and space flight control systems including aircraft, rockets (missiles and launch vehicles), entry vehicles and spacecraft (both orbital and attitude control). The broad coverage of topics emphasizes the synergies among the various flight control systems and attempts to show their evolution from the same set of physical principles as well as their design and analysis by similar mathematical tools. In addition, this book presents state-of-art control system design methods - including multivariable, optimal, robust, digital and nonlinear strategies - as applied to modern flight control systems. Advanced Control of Aircraft, Spacecraft and Rockets features worked examples and problems at the end of each chapter as well as a number of MATLAB / Simulink examples housed on an accompanying website at http://home.iitk.ac.in/~ashtew that are realistic and representative of the state-of-the-art in flight control.

Accomplishments of NOL/NSWC (the White Oak Laboratory) CreateSpace

The capacity and quality of the atmospheric flight performance of space flight vehicles is characterized by their aerodynamic data bases. A complete aerodynamic data base would encompass the coefficients of the static longitudinal and lateral motions and the related dynamic coefficients. In this book the aerodynamics of 27 vehicles are considered. Only a few of them did really fly. Therefore the aerodynamic data bases are often not complete, in particular when the projects or programs were more or less abruptly stopped, often due to political decisions. Configurational design studies or the development of demonstrators usually happen with reduced or incomplete aerodynamic data sets. Therefore some data sets base just on the application of one of the following tools: semi-empirical design methods, wind tunnel tests, numerical simulations. In so far a high percentage of the data presented is incomplete and would have to be verified. Flight mechanics needs the aerodynamic coefficients as function of a lot of variables. The allocation of the aerodynamic coefficients for a particular flight operation at a specific trajectory point is conducted by an aerodynamic model. The establishment of such models is described in this book. This book is written for graduate and doctoral students to give them insight into the aerodynamics of the various flight configurations. Further for design and

development engineers in industry and at research institutes (including universities) searching for an appropriate vehicle shape, as well as for non-specialists, who may be interested in this subject. The book will be helpful, too, in the case that system studies require in their concept phases the selection of suitable vehicle shapes.

Space Debris Springer Science & Business Media

Based on a long engineering experience, this book offers a comprehensive and state-of-the-art analysis of aerodynamic and flight mechanic entry topics. This updated edition had new chapters on Re-entry on Mars mission, flight quality, rarefied aerodynamics and re-entry accuracy. In addition, it provides a large set of application exercises and solutions.

Atmosphere, Ocean and Climate Dynamics AIAA

This book comprises select peer-reviewed papers from the International Conference on Emerging Trends in Electromechanical Technologies & Management (TEMT) 2019. The focus is on current research in interdisciplinary areas of mechanical, electrical, electronics and information technologies, and their management from design to market. The book covers a wide range of topics such as computer integrated manufacturing, additive manufacturing, materials science and engineering, simulation and modelling, finite element analysis, operations and supply chain management, decision sciences, business analytics, project management, and sustainable freight transportation. The book will be of interest to researchers and practitioners of various disciplines, in particular mechanical and industrial engineering.

Rigid Body Dynamics for Space Applications AIAA

Rigid Body Dynamics for Space Applications explores the modern problems of spaceflight mechanics, such as attitude dynamics of re-entry and space debris in Earth's atmosphere; dynamics and control of coaxial satellite gyrostats; deployment, dynamics, and control of a tether-assisted return mission of a re-entry capsule; and removal of large space debris by a tether tow. Most space systems can be considered as a system of rigid bodies, with additional elastic and viscoelastic elements and fuel residuals in some cases. This guide shows the nature of the phenomena and explains the behavior of space objects. Researchers working on spacecraft attitude dynamics or space debris removal as well as those in the fields of mechanics, aerospace engineering, and aerospace science will benefit from this book. Provides a complete treatise of modeling attitude for a range of novel and modern attitude control problems of spaceflight mechanics Features chapters on the application of rigid body dynamics to atmospheric re-entries, tethered assisted re-entry, and tethered space debris removal Shows relatively simple ways of constructing mathematical models and analytical solutions describing the behavior of very complex material systems Uses modern methods of regular and chaotic dynamics to obtain results

Structural Dynamics in Aeronautical Engineering Springer Science & Business Media

This book presents the latest researches on hypersonic steady glide dynamics and guidance, including the concept of steady glide reentry trajectory and the stability of its regular perturbation solutions, trajectory damping control technique for hypersonic glide reentry, singular perturbation guidance of hypersonic glide reentry, trajectory optimization based on steady glide, linear pseudospectral generalized nominal effort miss distance guidance, analytical entry guidance and trajectory-shaping guidance with final speed and load factor constraints. They can be used to solve many new difficult problems in entry guidance. And many practical engineering cases are provided for the readers for better understanding. Researchers and students in the fields of flight vehicle design or flight dynamics, guidance and control could use the book as valuable reference.

Dynamics of Atmospheric Re-entry Elsevier Inc. Chapters

This book explores topics that are central to the field of spacecraft attitude determination and control. The authors provide rigorous theoretical derivations of significant algorithms accompanied by a generous amount of qualitative discussions of the subject matter. The book documents the development of the important concepts and methods in a manner accessible to practicing engineers, graduate-level engineering students and applied mathematicians. It includes detailed examples from actual mission designs to help ease the transition from theory to practice and also provides prototype algorithms that are readily available on the author’s website. Subject matter includes both theoretical derivations and practical implementation of spacecraft attitude determination and control systems. It provides detailed derivations for attitude kinematics and dynamics and provides detailed description of the most widely used attitude parameterization, the quaternion. This title also provides a thorough treatise of attitude dynamics including Jacobian elliptical functions. It is the first known book to provide detailed derivations and explanations of state attitude determination and gives readers real-world examples from actual working spacecraft missions. The subject matter is chosen to fill the void of existing textbooks and treatises, especially in state and dynamics attitude determination. MATLAB code of all examples will be provided through an external website.

Space Flight Dynamics AIAA

Thorough coverage of space flight topics with self-contained chapters serving a variety of courses in orbital mechanics, spacecraft dynamics, and astronautics This concise yet comprehensive book on space flight dynamics addresses all phases of a space mission: getting to space (launch trajectories), satellite motion in space (orbital motion, orbit transfers, attitude dynamics), and returning from space (entry flight mechanics). It focuses on orbital mechanics with emphasis on two-body motion, orbit determination, and orbital maneuvers with applications in Earth-centered missions and interplanetary missions. Space Flight Dynamics presents wide-ranging information on a host of topics not always covered in competing books. It discusses relative motion, entry flight mechanics, low-thrust transfers, rocket propulsion fundamentals, attitude dynamics, and attitude control. The book is filled with illustrated concepts and real-world examples drawn from the space industry. Additionally, the book includes a “computational toolbox” composed of MATLAB M-files for performing space mission analysis. Key features: Provides practical, real-world examples illustrating key concepts throughout the book Accompanied by a website containing MATLAB M-files for conducting space mission analysis Presents numerous space flight topics absent in competing titles Space Flight Dynamics is a welcome addition to the field, ideally suited for upper-level undergraduate and graduate students studying aerospace engineering.