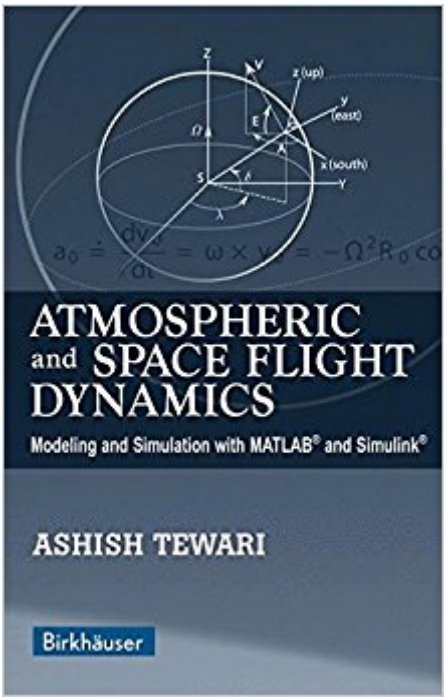
Atmospheric And Space Flight Dynamics: Modeling And Simulation With MATLABÃ‚Â® And SimulinkÃ‚Â® (Modeling And Simulation In Science, Engineering And Technology)



Synopsis

This book offers a unified presentation that does not discriminate between atmospheric and space flight. It demonstrates that the two disciplines have evolved from the same set of physical principles and introduces a broad range of critical concepts in an accessible, yet mathematically rigorous presentation. The book presents many MATLAB and Simulink-based numerical examples and real-world simulations. Replete with illustrations, end-of-chapter exercises, and selected solutions, the work is primarily useful as a textbook for advanced undergraduate and beginning graduate-level students.

Book Information

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Customer Reviews

"This book combines in a unified presentation both atmospheric and space flight dynamics in an introductory but rather broad level. The approach followed is very interesting and is well-suited to either teaching undergraduate students or complementing first-year graduate students. In fifteen chapters, topics like orbital mechanics, including some perturbations and details about the restricted three-body problem, rocket propulsion, atmospheric and transatmospheric trajectories, attitude and control are considered in a clear presentation. This condensed book even has some introductory explanations of kinematics and nice details about modeling the planetary atmosphere or the Earth's gravitational field, which makes it self-contained. The approach followed in each chapter is useful and direct with a list of objectives, many worked examples, exercises and a final summary. Another

interesting fact is that the book contains the implementation of the computations, in the way suggested by the author, using MATLAB code. This provides a distinct interpretation of formulae; moreover, it is not an obstruction for non-MATLAB users since the code is easy and easily movable to other programming languages."Ã Â Ã Â Ã¢â ¬â ¢Mathematical Reviews "This is a textbook for both undergraduate and graduate students studying aerospace and astronautics engineering. In fact the book is unique as it treats both atmospheric and space flights, namely, aircrafts and spacecrafts...Each chapter starts with aims and objectives and ends with a short summary and exercises which are solved by using MATLAB and Simulink codes."Ã Â Ã Â Ã¢â ¬â ¢Zentralblatt MATH

Modern aerospace vehicles, such as the space shuttle, other launch vehicles, and long-range ballistic missiles, do not discriminate between atmospheric and space flight. Most texts on flight dynamics, however, make this artificial distinction and therefore do not simultaneously cover aircraft and spacecraft. Bridging this gap in the literature, Atmospheric and Space Flight Dynamics is a unified presentation, demonstrating that the two disciplines have actually evolved from the same set of physical principles. Key features: * Introduction to a broad range of modern topics in an accessible, yet mathematically rigorous presentation * Many numerical examples and simulations utilizing MATLABÃ Â® and SimulinkÃ Â® fully integrated throughout the work * Simulations presentedÃ¢â ¬â ¢usually not found in books on the same topicÃ¢â ¬â ¢are both realistic and instructive * Examples allow readers to easily build their own simulations for aircraft, missiles, launch vehicles, reentry vehicles, and spacecraft * Software is used as an instructional, hands-on tool, moving away from the "cookbook" approach found in other works * Supplementary material and MATLAB/Simulink code available at http://home.iitk.ac.in/~ashtew/index_files/page0009.htm * Numerous illustrations and end-of-chapter exercises * Separate solutions manual available to instructors upon request Primarily useful as a textbook for advanced undergraduate and beginning graduate-level students, the work is also an excellent reference or self-study guide for researchers and practitioners in aerospace engineering, aviation, mechanical engineering, dynamics, astrodynamics, aeronautics, and astronautics.

Author Ashish Tewari provides an excellent introduction to applications of MATLAB and Simulink to aerospace problems. In the process of providing these illustrative cases, Atmospheric and Spaceflight Dynamics provides a comprehensive treatment of both fundamental and modern flight mechanics formulations. These derivations, of course, have frequently been published in other

texts, and in some cases they are accompanied by FORTRAN or C code, but Tewari's approach with MATLAB is a needed contribution. Moreover, the publishers have helped make this an accessible book with reasonable pricing. I'd say that the backcover description of the book's contents are essentially true.In his own introduction to the book Ashish Tewari explains his intent to provide "a unified approach to aircraft and spacecraft flight..." which is something that certainly grabs my attention. Like many people in industry I am very interested in reusable winged vehicles with perhaps both jet engines and rockets. These are vehicles which would certainly need that unified approach and, to interject, I would love to communicate more with the author about such ideas.Although I did say that there are similar introductions to flight mechanics available for students and others, I should add that the illustrative examples given in Tewari's book are quite distinctive and remarkable in themselves. Some might be familiar or basic, but many take on new problems to the textbook reader that one realizes are lurking out there in the field of aircraft or spacecraft development somewhere.Ashish Tewari also wrote a related textbook "Modern Control Design with MATLAB and Simulink", also with aerospace illustrative examples. This book is helpful as well and I think the two together could be treated as Volume I and Volume II. Though when Tewari introduced the subject of a vectoring a rocket through the atmosphere as its mass and inertia vary along with its aerodynamic loads... I think he has set himself up for writing Volume III.

I purchased this book as a reference for my aerospace engineering senior design project, in which I functioned as the dyanmics and control analyst. This book proved to be invaluable in every aspect of my responsibilities, particularly and most importantly in actual simulation of the equations of motion. The specific MATLAB codes provided are an excellent reference for writing your own scripts and functions for the numerical integration, and auxillary functions like the atmosphere and gravity programs were huge time-savers. If unfamiliar with the material, his step-by-step approach to the end goal of simulating a wide variety of atmospheric, transatmospheric, and spaceflight/orbital problems in both aero- and astronautical vehicles is perfectly structured. You will gain valuable insight into common dynamic modeling assumptions, both in 3 and 6 degree of freedom problems. I could not have asked for a better text.The only possible suggestion for improvement I have is a greater number of even more in-depth, modern-type problems, like a recurring Space Shuttle example; this would cover a vertical-take off rocket with unique strcuture, aerodynamics, and staging into orbit, rendezvous with an orbiting station, lifting body reentry, and glide-to-target landing. Other possibilities include atmospheric simulations of hypersonic vehicles with ramjet/scramjet type propulsion. Still, these are just small suggestions in the face of what is an

overall excellent publication; I would certainly buy future works from this author, particularly those with similar topics and examples as brought up above.

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