



Modeling and Simulation of Aerospace Vehicle Dynamics, Second Edition (Aiaa Education Series)

By P. Zipfel

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This book unifies all aspects of flight dynamics for the efficient development of aerospace vehicle simulations. Now in its second edition, its purpose is still to provide the reader with a complete set of tools to build, program, and execute simulations. Unlike other books, it uses tensors for modeling flight dynamics in a form invariant under coordinate transformations. For implementation, the tensors are converted into matrices, resulting in compact computer code. The reader can pick FORTRAN templates of missiles, aircraft, or hypersonic vehicles from the complimentary "CADAC" CD-ROM to jump-start a particular application, and plot the results of CADAC Studio. It is the only textbook that combines the theory of modeling with hands-on examples of three-, five-, and six-DoF simulations. This new and enlarged edition also serves as anchor for a self-tutoring, three-part course of aerospace simulations in C++, available from AIAA. Amply illustrated with 318 figures and 44 examples, the text can be used for advanced undergraduate and graduate instruction or for self-study. Seventy eight problems and nine projects amplify the topics and develop the material further. Qualified instructors can obtain a complimentary solution manual from AIAA. This second edition contains two new appendices. The original Appendix C, which reviewed state-of-the-art FORTRAN simulations, has been replaced by the description of three self-study CD-ROMs of aerospace simulations in C++. These CDs broaden the applications of this book by spanning from simple three degrees of freedom cruise missiles to high fidelity missiles, aircraft, and hypersonic vehicles. The new Appendix D lays the theoretical foundation of tensor flight dynamics. It contains the proofs of the rotational time derivative and the Euler transformation.

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Editorial Review

About the Author

Peter H. Zipfel is a graduate of the University Stuttgart, Germany, and the Catholic University of America with a Ph.D. in aerospace engineering. Currently an Adjunct Associate Professor at the University of Florida, he has also worked with the German Helicopter Institute, the U.S. Army and Air Force. He has 45 years of experience in aerospace vehicle simulations including helicopters, missiles, airplanes, and hypersonic vehicles. He is an AIAA Associate Fellow, serves on the editorial board of the AIAA Progress Series in Astronautics and Aeronautics, the Atmospheric Flight Mechanics and the Professional Member Education committees and is a distinguished international lecturer of modeling and simulation short courses.

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