Strapdown Analytics - Second Edition

Paul G. Savage, STRAPDOWN ASSOCIATES, INC.

This hard cover text in two volumes (Parts 1 and 2) is the second edition of *Strapdown Analytics*. It contains all material provided in the first edition including errata corrections uncovered since the original publication in 2000. This edition contains an additional Chapter 19 which presents three relevant strapdown papers published by the author since 2000.

Strapdown Analytics provides a detailed comprehensive discourse on the analytics of strapdown inertial navigation systems (INSs), the basic technology used on modern day commercial and military aircraft, guided missiles, surface ships and underwater vehicles. It develops the algorithms implemented in the strapdown system computer as well as providing the analytics associated with system software validation, system test, simulation, performance analysis, and the analytical design methodology used in deriving the strapdown equations. Included is an in-depth chapter dealing with Kalman filter theory and its application to the aiding of a strapdown INS.

The title of the book, *Strapdown Analytics*, has a double meaning. It deals with the analytics associated with strapdown inertial navigation systems; it also describes the analytics used at the author's company, Strapdown Associates, Inc. (SAI or "Strapdown" for short) over the 20 year period following its inception in 1980. During this time, SAI developed strapdown inertial navigation application software in both free-inertial and Kalman-filter-aided configurations for various private and governmental organizations including validation software, system test software, simulators, and associated performance analyses. In addition to being SAI's president, one of the author's principal responsibilities was to prepare the technical documentation for these programs.

Strapdown Analytics has been prepared for the reader who may not have had experience in navigation or Kalman filtering. The analytical material presented is derived from scratch, showing the developmental steps in rigorous detail, without relying on reference material for supporting analytics. The book is complicated, yet complete and understandable by analytically inclined graduate students and practicing engineers. The book can be viewed as the text for an advanced course one might take following the introductory course taught by the author, *Introduction To Strapdown Inertial Navigation Systems.* To aid the reader, the book includes several unique features:

- Clearly delineated parameter definitions separated from the main text, including a parameter index for referencing to the book location where the parameter was defined.
- Repeating a parameter definition where needed for clarity in sections that are far removed from the section in which it was originally defined.
- Deriving equations beginning from basics; avoiding the practice of referencing supporting equations to other source material.
- Providing equation derivations that show the intermediate steps to avoid having the reader accept results on faith, or spend valuable time filling in the voids for verification.

About The Author

Paul G. Savage is an internationally recognized expert in the design and test of ring laser gyro strapdown inertial navigation systems. He is the President and Chief Analyst of Strapdown Associates, Inc. (SAI), a Minnesota engineering company he founded in 1980 to further the advancement of strapdown inertial technology. Since the down-sizing of SAI in 1995, Mr. Savage has continued to provide inertial navigation consultation services and teach his *Introduction To Strapdown Inertial Navigation Systems* course to the aerospace industry.

From 1963 to 1980, Mr. Savage was employed at Honeywell, Inc. as Senior Principal Engineering Fellow where he led engineering design teams in the evolutionary development of laser gyro strapdown inertial navigation systems. Mr. Savage was the engineering manager and system design engineer for the Honeywell LINS-0 strapdown inertial system, the first to prove the readiness of laser gyro strapdown inertial navigation technology for aircraft applications as demonstrated during a landmark flight test series at Holloman Air Force Base in 1975.

Mr. Savage is a graduate from the Massachusetts Institute of Technology where he received his MS and BS degrees in Aeronautical Engineering in 1960.

Strapdown Analytics, Second Edition - Part 1

Contents (841 Pages)

Strapdown Analytics, Second Edition - Part 2

Contents (805 Pages)