



Tracking and Kalman Filtering Made Easy

By *Eli Brookner*

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Tracking and Kalman Filtering Made Easy By Eli Brookner

A unique, easy-to-use guide to radar tracking and Kalman filtering

This book presents the first truly accessible treatment of radar tracking; Kalman, Swerling, and Bayes filters for linear and nonlinear ballistic and satellite tracking systems; and the voltage-processing methods (Givens, Householder, and Gram-Schmidt) for least-squares filtering to correct for computer round-off errors. Tracking and Kalman Filtering Made Easy emphasizes the physical and geometric aspects of radar filters as well as the beauty and simplicity of their mathematics. An abundance of design equations, procedures, and curves allows readers to design tracking filters quickly and test their performance using only a pocket calculator!

The text incorporates problems and solutions, figures and photographs, and astonishingly simple derivations for various filters. It tackles problems involving clutter returns, redundant target detections, inconsistent data, track-start and track-drop rules, data association, matched filtering, tracking with chirp waveform, and more. The book also covers useful techniques such as the moving target detector (MTD) clutter rejection technique. All explanations are given in clear and simple terms, including:

- * The voltage-processing approach to least-squares filtering
- * The correlation between such procedures as discrete orthogonal Legendre polynomial (DOLP) and voltage processing
- * The mathematical sameness of tracking and estimation problems on the one hand, and sidelobe canceling and adaptive array processing on the other
- * The massively parallel systolic array sidelobe canceler processor
- * Important computational accuracy issues
- * An appended comparison between the Kalman and the Swerling filters, written by Dr. Peter Swerling

Tracking and Kalman Filtering Made Easy is invaluable for engineers, scientists, and mathematicians involved in tracking filter design. Its straightforward approach makes it an excellent textbook for senior-undergraduate and first-year graduate courses.

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Editorial Review

From the Publisher

This book is about radar tracking and the use of filters, particularly Kalman Filters. Tracking of moving targets, such as satellites, is complicated by the introduction of errors into the measurements resulting from noise and non-uniform vehicle motion. Such errors are smoothed out by filters. The book covers these filters from very simple, physical and geometric approaches.

From the Back Cover

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About the Author

ELI BROOKNER, DSc, is a Consulting Scientist with Raytheon Company in Sudbury, Massachusetts. Over a long and distinguished career, he has conceived and/or designed numerous radar systems, including Wake Measurement Radar and the first TWT radar put into space. A world-renowned teacher and lecturer, he is editor and principal contributor of three previous books: Radar Technology, Aspects of Modern Radar, and Practical Phased Array Antenna Systems.

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