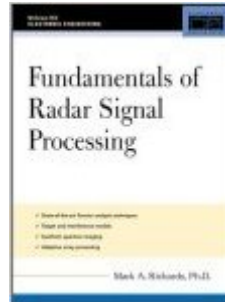# Fundamentals Of Radar Signal Processing

Synopsis

Master the signal processing knowledge and skillsessential to understand today's advanced radar systemsevolved from a course taught by a respected leader in the field, this rigorous text provides detailed coverage of radar dsp fundamentals and applications not to be found elsewhere in the literature. Written for graduate engineering students and working professionals seeking enhanced skills and career advancement, mark richard's fundamentals of radar signal processing provides clear, modern instruction in radar dsp basics and the skills needed in both design and analysis of common radar algorithms. This text is ideal for those looking to go beyond the cursory treatment of signal processing in general radar systems books to seek more detailed treatments of signal models, waveforms, interference reduction, and detection, as well as to gain the foundation needed for specialty texts that focus on advanced radar signal processing topics such as sar and stap. Developed and tested over many years of graduate and professional education, this in-depth introduction to the radar dsp techniques at the foundation of current advanced radar technologies provides a thorough description and detailed examples of:signal acquisition and sampling in multiple domainstarget and interference modelscommon radar waveformsinterference reduction techniquesdetection algorithms and toolsbasic synthetic aperture imaging and adaptive array processingmuch moredevelop in-depth understanding of radar dsp fundamentals:introduction to radar systems signal models sampling and quantization of pulsed radar signals radar waveforms doppler processing detection fundamentals constant false alarm rate (cfar) detection introduction to synthetic aperture imaging introduction to beamforming and space-time adaptive processing tracking bibliography

Book Information

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Customer Reviews

This is a superior book! There is nothing comparable in either the general radar or the signal processing literature. It provides an exceptionally clear treatment of difficult subject matter. The author patiently guides the reader through radar basics and then into the depths of the associated data processing concepts. The treatment is so lucid that even a neophyte can expect to develop a deep understanding of the concepts involved and be able to apply them immediately (i.e.,When the boss comes in and says, "You're my radar expert. Tell me how you're going to process the all the data!", this book is the antidote to the ensuing panic attack.). The clarity of the brief radar dicussions throughout the text (e.g., the SAR chapter)will provide glimmers of additional insight on radar even to those with indepth knowledge of the area.The sensor-related texts by Georgia Tech authors are of uniformly high quality. This is the best of the lot.

I have enjoyed this book enormously throughout. While there are a fairly large number of radar books available, this is the first that I have read that lays out the signal processing aspects of radar in such a coherent, pedagogically sound, and self-contained way, generally from first principles. For example, the exposition of slow and fast time processing throughout the book was very illuminating, as was the connection drawn between the Neyman-Pearson receiver and the matched filter. The only other text I have seen that combines such clarity of vision, readability, and rigor is the book by Peebles, which unfortunately has little material on digital radar signal processing.

This text definitely fills a void in the unclassified radar textbook literature. Perhaps if one looks in a library for some out-of-print titles such as those from the MIT Radiation Laboratory Series, one might find similar coverage. However this text is "in print", modern, and up-to-date.Chapter 2 deals with some basic topics about radar signals, and Chapter 3 discusses sampling and quantization topics, which are vital in the modern DSP era. Chapter 4 discusses Matched Filters and the signal processing of a number of modulated radar waveforms. Chapter 5 discusses Doppler processing, which is an important modern topic.Chapter 6 discusses Radar Threshold Detection. However, if one truly wants to grasp the detection problem, one ought to read Volumes I & III of Van Trees, the first covering the basics of Detection and Estimation Theory, and the latter covering the D&E problem for Radar with some in depth mathematics.Chapters 7,8, and 9 of Richards proceed to deal with the advanced topics of CFAR Detection, Synthetic Aperture Radar (SAR), beamforming, and Space-Time Adaptive Processing (STAP). All in all, starting with the basics, this book by Richards is a pretty thorough coverage of Radar Signal Processing.If one wants to understand radar from a

DSP perspective, first read Skolnik's "Introduction To Radar Systems" to get a basic understanding of how radar works. Then read this book by Richards to understand radar DSP.

Most of the books on the fundamentals of radar approach the subject from a EE / hardware standpoint. This makes it hard to understand the subject if you're unfamiliar with standard ciruits. This book goes through in detail the math which those circuits represent and therefore provides a solid basis of understanding of the subject. It's also written in a fluent and approachable style.

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