

# Principles Of Modern Radar Basic Principles

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principles of modern radar advanced techniques is a professional reference for practicing engineers that provides a stepping stone to advanced practice with indepth discussions of the most commonly used advanced techniques for radar design it will also serve advanced radar academic and training courses with a complete set of problems for students as well as solutions for instructors this book provides an introduction to advanced radar methods available spanning the gamut of the most exciting radar capabilities from exotic waveforms to ultrahigh resolution 2d and 3d imaging methods complex adaptive interference cancellation multitarget tracking in dense scenarios and more the most uptodate methods such as multipleinput multipleoutput mimo are covered all of this material is presented with the same careful balance of quantitative rigor and qualitative insight of principles of modern radar basic principles scitech 2010

the important and fascinating topics of radar enjoy an extensive audience in industry and government but deserve more attention in undergraduate education to better prepare graduating engineers to meet the demands of modern mankind radar is not only one of the major applications of electronics and electromagnetic communications but it is also a mature scientific discipline with significant theoretical and mathematical foundations that warrant an intellectual and educational challenge fundamental principles of radar is a textbook providing a first exposure to radar principles it provides a broad concept underlying the basic principle of operations of most existing radar systems and maintains a good balance of mathematical rigor to convince readers without losing interest the book provides an extensive exposition of the techniques currently being used for radar system design analysis and evaluation it presents a comprehensive set of radar principles including all features of modern radar applications with their underlying derivations using simple mathematics coverage is limited to

the main concepts of radar in order to present them in a systematic and organized fashion topics are treated not as abstruse and esoteric to the point of incomprehensibility but the very complex and rich technology of radar is distilled into its fundamentals the author s emphasis is on clarity without sacrificing rigor and completeness thus making the book broad enough to satisfy a variety of backgrounds and interests thorough documentation provides an unusual degree of completeness for a textbook at this level with interesting and sometimes thought provoking content to make the subject even more appealing key features covers a wide range of topics in radar systems includes examples and exercises to reinforce the concepts presented and explain their applications provides self contained chapters useful for readers seeking selective topics provides broad concepts underlying the basic principles of operations of most types of radars in use today includes documentation to lead to further reading of interesting concepts and applications

this three volume resource is a comprehensive and modern textbook for courses in radar systems and technology at the college senior and graduate student level a professional training textbook for formal in house courses for new hires a reference for ongoing study following a radar short course and a self study and professional reference volume 1 provides fundamental discussions of radar operation volume 2 discusses key aspects of radar signal processing waveforms and other important radar techniques critical to the performance of current and future radar systems and volume 3 describes fifteen different system applications or class of applications in more detail than can be found in volumes 1 or 2

what this book is this book is about radar it will teach you the essentials of radar the underlying principles it is not like an engineering handbook which provides detailed design equations without explaining either derivation or rationale it is not like a graduate school textbook which may be abstruse and esoteric to the point of incomprehensibility and it is not like an anthology of popular magazine articles which may be gaudy but superficial it is an attempt to distill the very complex rich technology of radar into its fundamentals tying them to the laws of nature on one end and to the most modern and complex systems on the other who it s for if your work requires you to supervise or meet as coequals with radar systems engineers or designers this book will allow you to understand them to question them intelligently and perhaps to provide them with a perspective a dispassionate yet competent view that they lack if you are trained in another discipline but have been made the manager of a radar project or a system program that has one or more radars as sub systems this book will provide you with the tools you need not only to give your team members confidence but also to make a substantive technical contribution yourself

a complete guide to the full spectrum of fundamental radar signal processing systems fully updated for the latest advances this thoroughly revised resource offers comprehensive coverage of foundational digital signal processing methods for both pulsed and fmcw radar developed from the author s extensive academic and professional experience fundamentals of radar signal processing third edition covers all of the digital signal processing techniques that form the backbone of modern radar systems revealing the common threads that unify them the basic tools of linear systems filtering sampling and fourier analysis are used throughout to provide a unified tutorial approach you will get end of chapter problems that reinforce and apply salient points as well as an online suite of tutorial matlab r demos and supplemental technical notes classroom instructors additionally receive a solutions manual and sample matlab tutorial demos coverage includes an introduction to radar systems signal models data acquisition and organization waveforms and pulse compression doppler processing threshold detection and cfar measurements and tracking synthetic aperture imaging adaptive array processing and stap

this book principles of modern radar has as its genesis a georgia tech short course of the same title this short course has been presented annually at georgia tech since 1969 and a very comprehensive set of course notes has evolved during that seventeen year period the 1986 edition of these notes ran to 22 chapters and all of the authors involved except mr barrett were full time members of the georgia tech research faculty after considerable encouragement from various persons at the university and within the radar community we undertook the task of editing the course notes for formal publication the contents of the book that ensued tend to be practical in nature since each contributing author is a practicing engineer or scientist and each was selected to write on a topic embraced by his area s of expertise prime examples are chaps 2 5 and 10 which were authored by e f knott g w ewell and n c currie respectively each of these three researchers is recognized in the radar community as an expert in the technical area that his chapter addresses and each had already authored and published a major book on his subject several other contributing authors including dr bodnar mr bruder mr corriher dr reedy dr trebits and mr scheer also have major book publications to their credit

the most complete current guide to the signal processing techniques essential to advanced radar systems fully updated and expanded fundamentals of radar signal processing second edition offers comprehensive coverage of the basic digital signal processing techniques and technologies on which virtually all modern radar systems rely including target and interference models matched filtering waveform design doppler processing threshold detection and measurement accuracy the methods and interpretations of linear systems filtering sampling and fourier analysis are used throughout to provide a unified tutorial approach end of chapter problems reinforce the material covered developed over many years of academic and professional education this authoritative resource is ideal for graduate students as well as practicing engineers fundamentals of radar signal processing second edition covers introduction to radar systems signal models pulsed radar data acquisition radar waveforms doppler processing detection fundamentals measurements and tracking introduction to synthetic aperture imaging introduction to beamforming and space time adaptive processing

the rapid development of electronics and its engineering applications ensures that new topics are always competing for a place in university and polytechnic courses but it is often difficult for lecturers to find suitable books for recommendation to students particularly when a topic is covered by a short lecture module or as an option macmillan new electronics offers introductions to advanced topics the level is generally that of second and subsequent years of undergraduate courses in electronic and electrical engineering computer science and physics some of the authors will paint with a broad brush others will concentrate on a narrower topic and cover it in greater detail but in all cases the titles in the series will provide a sound basis for further reading of the specialist literature and an up to date appreciation of practical applications and likely trends the level scope and approach of the series should also appeal to practising engineers and scientists encountering an area of electronics for the first time or needing a rapid and authoritative update vii preface the basic principles of radar do not change but the design and technology of practical radar systems have developed rapidly in recent years advances in digital electronics and computing are having a major impact especially in radar signal processing and display i hope that this book will prove a useful introduction to such developments as well as to the underlying principles of radar detection

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