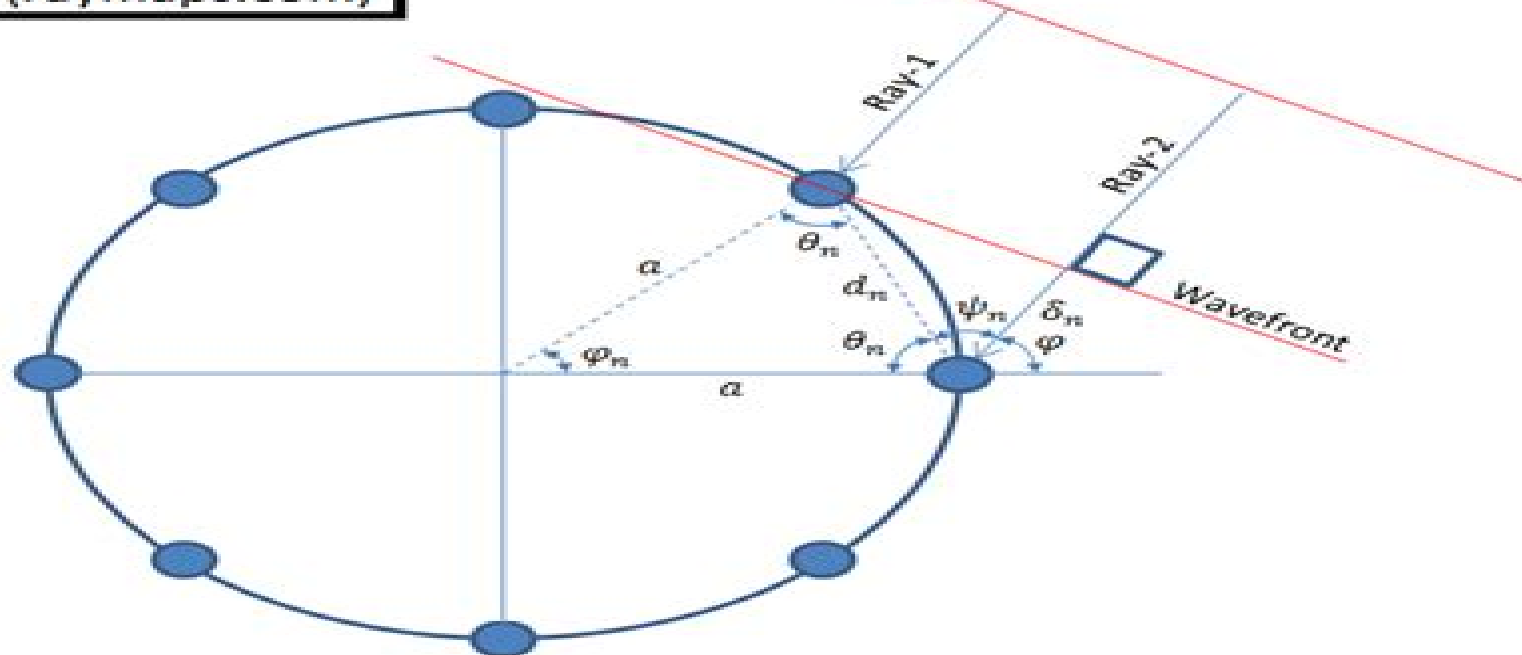**Circular Array
Derivation of Array Factor
Method-1 (raymaps.com)**

Step 1

$$\varphi_n + \theta_n + \theta_n = 180$$
$$2\theta_n = 180 - \varphi_n$$
$$\theta_n = 90 - \frac{\varphi_n}{2}$$

Step 2

$$\theta_n + \psi_n + \varphi = 180$$
$$\psi_n = 180 - \varphi - \theta_n$$
$$\psi_n = 180 - \varphi - \left(90 - \frac{\varphi_n}{2}\right)$$
$$\psi_n = 90 - \varphi + \frac{\varphi_n}{2}$$

Step 3

$$\frac{d_n}{2} = a \sin \frac{\varphi_n}{2}$$
$$d_n = 2\, a \sin \frac{\varphi_n}{2}$$

Step 4

$$\delta_n = d_n \cos \psi_n$$
$$\delta_n = 2a \sin \left(\frac{\varphi_n}{2}\right) \cos \left(90 - \varphi + \frac{\varphi_n}{2}\right)$$
$$\delta_n = 2a \sin \left(\frac{\varphi_n}{2}\right) \sin \left(\varphi - \frac{\varphi_n}{2}\right)$$
$$\delta_n = a[\cos(\varphi - \varphi_n) - \cos \varphi]$$

$$AF = \sum_{n=0}^{N-1} e^{-jka\cos(\varphi - \varphi_n)}$$

Circular Array Matlab Code

Bassem R. Mahafza

Circular Array Matlab Code:

Introduction to Radar Using Python and MATLAB Lee Andrew (Andy) Harrison,2019-10-31 This comprehensive resource provides readers with the tools necessary to perform analysis of various waveforms for use in radar systems It provides information about how to produce synthetic aperture SAR images by giving a tomographic formulation and implementation for SAR imaging Tracking filter fundamentals and each parameter associated with the filter and how each affects tracking performance are also presented Various radar cross section measurement techniques are covered along with waveform selection analysis through the study of the ambiguity function for each particular waveform from simple linear frequency modulation LFM waveforms to more complicated coded waveforms The text includes the Python tool suite which allows the reader to analyze and predict radar performance for various scenarios and applications Also provided are MATLAB scripts corresponding to the Python tools The software includes a user friendly graphical user interface GUI that provides visualizations of the concepts being covered Users have full access to both the Python and MATLAB source code to modify for their application With examples using the tool suite are given at the end of each chapter this text gives readers a clear understanding of how important target scattering is in areas of target detection target tracking pulse integration and target discrimination *A Practical Guide to EMC Engineering* Levent Sevgi,2017-03-31 This practical new resource explores the fundamentals of EMC engineering and examines the concepts and underpinnings of electromagnetics This book highlights the procedures from design to market for both technical and non technical issues including market control accreditation calibration EMC tests and measurement and EMC protection Basic electrical engineering theories Maxwell equations EM scattering diffraction and propagation in the electromagnetic model are presented The circuit model including lumped parameter circuit elements two port circuit definitions grounding common and differential model currents and microstripline circuits are explored This book also covers antennas and antenna calibration including communication antennas normalized site attenuation NSA loop antennas and loop antenna calibration LAC Noise and frequency analysis on fundamental electromagnetic signals noise and transforms is explained Readers find insight into EMC test and measurement environments and devices Time saving MATLAB code is included in this resource to help engineers with their projects in the field **Radar Systems Analysis and Design Using MATLAB** Bassem R. Mahafza,2016-04-19 Developed from the author s graduate level courses the first edition of this book filled the need for a comprehensive self contained and hands on treatment of radar systems analysis and design It quickly became a bestseller and was widely adopted by many professors The second edition built on this successful format by rearranging and updating Electromagnetic Modeling and Simulation Levent Sevgi,2014-03-13 This unique book presents simple easy to use but effective short codes as well as virtual tools that can be used by electrical electronic communication and computer engineers in a broad range of electrical engineering problems Electromagnetic modeling is essential to the design and modeling of antenna radar satellite medical imaging and

other applications In this book author Levent Sevgi explains techniques for solving real time complex physical problems using MATLAB based short scripts and comprehensive virtual tools Unique in coverage and tutorial approach Electromagnetic Modeling and Simulation covers fundamental analytical and numerical models that are widely used in teaching research and engineering designs including mode and ray summation approaches with the canonical 2D nonpenetrable parallel plate waveguide as well as FDTD MoM and SSPE scripts The book also establishes an intelligent balance among the essentials of EM MODSIM The Problem the physics The Theory and Models mathematical background and analytical solutions and The Simulations code developing plus validation verification and calibration Classroom tested in graduate level and short courses Electromagnetic Modeling and Simulation Clarifies concepts through numerous worked problems and quizzes provided throughout the book Features valuable MATLAB based user friendly effective engineering and research virtual design tools Includes sample scenarios and video clips recorded during characteristic simulations that visually impact learning available on wiley com Provides readers with their first steps in EM MODSIM as well as tools for medium and high level code developers and users Electromagnetic Modeling and Simulation thoroughly covers the physics mathematical background analytical solutions and code development of electromagnetic modeling making it an ideal resource for electrical engineers and researchers *Handbook of Position Location* Reza Zekavat,R. Michael Buehrer,2011-09-09 Radio systems capable of localization have emerging applications in homeland security law enforcement emergency response defense command and control multi robot coordination and vehicle to vehicle and vehicle to pedestrian collision avoidance In fact high resolution localization is vital for many applications including traffic alert emergency services e g indoor localization for firefighters and battlefield command and control These systems promise to dramatically reduce society s vulnerabilities to catastrophic events and improve its quality of of life While work this important area is progressing limited resources are available to support graduate students and researchers in this important area Specifically a limited number of books has been published in this area covering selected subjects This comprehensive handbook offers gaps of available localization books presenting in depth coverage from fundamentals of coordinates to advanced application examples **Computational Intelligence in Data Mining - Volume 2** Lakhmi C. Jain,Himansu Sekhar Behera,Jyotsna Kumar Mandal,Durga Prasad Mohapatra,2014-12-10 The contributed volume aims to explicate and address the difficulties and challenges that of seamless integration of the two core disciplines of computer science i e computational intelligence and data mining Data Mining aims at the automatic discovery of underlying non trivial knowledge from datasets by applying intelligent analysis techniques The interest in this research area has experienced a considerable growth in the last years due to two key factors a knowledge hidden in organizations databases can be exploited to improve strategic and managerial decision making b the large volume of data managed by organizations makes it impossible to carry out a manual analysis The book addresses different methods and techniques of integration for enhancing the overall goal of data mining The book helps

to disseminate the knowledge about some innovative active research directions in the field of data mining machine and computational intelligence along with some current issues and applications of related topics *Teaching Electromagnetics* Krishnasamy T. Selvan,Karl F. Warnick,2021-06-17 Teaching Electromagnetics Innovative Approaches and Pedagogical Strategies is a guide for educators addressing course content and pedagogical methods primarily at the undergraduate level in electromagnetic theory and its applications Topics include teaching methods lab experiences and hands on learning and course structures that help teachers respond effectively to trends in learning styles and evolving engineering curricula The book grapples with issues related to the recent worldwide shift to remote teaching Each chapter begins with a high level consideration of the topic reviews previous work and publications and gives the reader a broad picture of the topic before delving into details Chapters include specific guidance for those who want to implement the methods and assessment results and evaluation of the effectiveness of the methods Respecting the limited time available to the average teacher to try new methods the chapters focus on why an instructor should adopt the methods proposed in it Topics include virtual laboratories computer assisted learning and MATLAB tools The authors also review flipped classrooms and online teaching methods that support remote teaching and learning The end result should be an impact on the reader represented by improvements to his or her practical teaching methods and curricular approach to electromagnetics education The book is intended for electrical engineering professors students lab instructors and practicing engineers with an interest in teaching and learning In summary this book Surveys methods and tools for teaching the foundations of wireless communications and electromagnetic theory Presents practical experience and best practices for topical coverage course sequencing and content Covers virtual laboratories computer assisted learning and MATLAB tools Reviews flipped classroom and online teaching methods that support remote teaching and learning Helps instructors in RF systems field theory and wireless communications bring their teaching practice up to date Dr Krishnasamy T Selvan is Professor in the Department of Electronics Communication Engineering SSN College of Engineering since June 2012 Dr Karl F Warnick is Professor in the Department of Electrical and Computer Engineering at BYU **Programming Selected Chapters** Austin,1998-10 Advances in Near-surface Seismology and Ground-penetrating Radar, Volume 15 Richard D. Miller,John H. Bradford,Klaus Holliger,Rebecca B. Latimer,2010-01-11 Advances in Near surface Seismology and Ground penetrating Radar SEG Geophysical Developments Series No 15 is a collection of original papers by renowned and respected authors from around the world Technologies used in the application of near surface seismology and ground penetrating radar have seen significant advances in the last several years Both methods have benefited from new processing tools increased computer speeds and an expanded variety of applications This book divided into four sections Reviews Methodology Integrative Approaches and Case Studies Captures the most significant cutting edge issues in active areas of research unveiling truly pertinent studies that address fundamental applied problems This collection of manuscripts grew from a core group of papers presented at a post convention workshop

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