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Nota di contenuto	Contents; Preface; Preface to the 2nd edition; Abbreviations; Symbols; Chapter 1: Introduction; Chapter 2: Signal representation and mathematical tools; 2.1 Vectors, matrices; 2.2 Computing with matrices; 2.2.1 Addition and subtraction; 2.2.2 Multiplication; 2.2.3 Identity matrix; 2.2.4 Inverse matrix; 2.2.5 Eigenvalue decomposition; 2.2.6 QR decomposition; 2.3 Fourier transform; 2.3.1 Fast Fourier transform; 2.4 Filter in the frequency and time domain; 2.5 Correlation; 2.6 Wiener-Khintchine theorem; References; Chapter 3: Statistical signal theory; 3.1 The general tasks of signal processing 3.2 Introduction to basics of statistics3.2.1 Probabilities for discrete random variables; 3.2.2 Continuous random variables; 3.2.3 Functions of random variables; 3.2.4 Statistical averages; 3.2.5 Correlation; 3.2.6

Gaussian density function; 3.2.7 Correlated Gaussian variables; 3.2.8 Complex Gaussian variables; 3.3 Likelihood-ratio test; 3.4 Parameter estimation; 3.4.1 Variance of the estimate and Crame r-Rao limit; 3.5 Estimation of a signal; 3.5.1 Maximum-likelihood estimation; 3.5.2 Signal estimation with least mean-square error; 3.5.3 Interference suppression by the inverse covariance
4.6 Concepts for an extended field of view4.6.1 Volume array for complete azimuth coverage; 4.7 Monitoring of phased array antennas; 4.7.1 Antenna measurement; 4.7.2 Transmit/receive module (TRM) monitoring; 4.8 Appendix: Taylor and Bayliss weighting; References; Chapter 5: Beamforming; 5.1 Single receiving beam; 5.1.1 RF-beamforming; 5.1.2 Subarrays and partial digital beamforming; 5.1.3 Dynamic range requirements; 5.1.4 Subarray configuration for digital sum and difference beamforming; 5.1.5 Correction of antenna failures; 5.1.6 Digital beamforming at element level
5.2 Broad band beamforming5.3 Multiple beams; 5.3.1 RF multiple beamforming; 5.3.2 RF-multiple beamforming using subarrays; 5.3.3 IF multiple beamforming by a resistive network; 5.3.4 Baseband multiple beamforming; 5.3.5 Time-multiplex beamforming for arbitrary directions; 5.3.6 Digital multiple beamforming using subarrays; 5.3.7 Multiple beam cluster for target search; 5.3.7.1 Fan beam for transmitting and receiving; 5.3.7.2 Fan beam for transmitting and a cluster of pencil beams for receiving; 5.4 Deterministic spatial filtering; 5.5 Compressed sensing for beamforming; References
Chapter 6: Sampling and digitisation of signals

Sommario/riassunto

Radar Techniques Using Array Antennas is a thorough introduction to the possibilities of radar technology based on electronic steerable and active array antennas. Topics covered include array signal processing, array calibration, adaptive digital beamforming, adaptive monopulse, superresolution, pulse compression, sequential detection, target detection with long pulse series, space-time adaptive processing (STAP), moving target detection using synthetic aperture radar (SAR), target imaging, energy management and system parameter relations. The discussed methods are confirmed by simulation stud