ADVANCED TECHNIQUES OF RADAR DETECTION IN NON-GAUSSIAN BACKGROUND

Abstract: The modeling of the clutter echoes is a central issue for the design and performance evaluation of radar systems. Aim of this lecture is to describe the state-of-the-art approaches to the modeling and understanding of non-Gaussian radar clutter echoes and their implications on performance prediction and signal processors design.

After a short first part dedicated to modern statistical and spectral models for high-resolution sea and ground clutter and to the methods of experimental validation using recorded data sets, the lecture will focus on coherent radar detection in non-Gaussian background.

In high-resolution radar systems, the disturbance cannot be modeled as Gaussian distributed and the classical detectors suffer from high losses. Then, according to the adopted disturbance model, optimum and sub-optimum detectors are derived and their performance analyzed against a non-Gaussian background. Different interpretations of the various detectors are provided that highlight the relationships and the differences among them. Moreover, some discussion is dedicated to how to make adaptive the detectors, by incorporating a proper estimate of the disturbance covariance matrix, in order to guarantee the CFAR behavior of the detector. A plethora of results with simulated and real recorded data will be shown.

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