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Chapter 9

Direction of Arrival Estimation in Multiple Signal Classification (Music) Using Linear Antenna Array

Zuhani Ismail Khan & Md. Rafiqul Islam

Introduction

An antenna array has been used to provide the direction of arrival (DOA) estimation by applying associated receiving steering vector and invert relationship. There exist a Fourier relationship between the beam pattern and excitation at the array which allows the DOA estimation problem to be treated as equivalent to spectral estimation [1].

In practice, the estimation is made difficult by the fact that is usually an unknown number of signals impinging on the array simultaneously, each from unknown directions and with unknown amplitudes. Also, the received signals are always corrupted by noise. Nevertheless, there are several methods to estimates the number of signals and their directions.

The Multiple Signal Classification (MUSIC) method has received the most attention and has been widely studied [2]. MUSIC algorithm is applicable to arrays with arbitrary geometry. But the array response must be measured and stored for all possible combinations of source parameters. The advantage of this algorithm is that it exhibits high resolution. However, it can be computationally intensive, since it requires a search through the entire array manifold for the steering vectors that are orthogonal to the noise subspace [3].