ESTIMATING THE DIRECTION OF ARRIVAL OF THE MULTIPATH RADIO SIGNAL USING CAPON TECHNIQUE

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Abstract

One of the aim of array signal processing is to extract useful characteristic of the incident signal(s) field such as the Direction Of Arrival (DOA). The radio signals incident on the array are considered as plane waves, narrowband and may reach the array via multipath propagation such as reflection,refraction and diffffraction occurs in outdoor and indoor environment From the previous project [19], the used of Bartlett Beamforming technique in DOA estimation using uniform linear and planar array were presented. However, it has limited resolution in resolving two closely space signal . To overcome the problem, Capon method is introduced. Capon method provides high resolution estimation of the DOA of the multipath radio signals. The comparison of performance between Bartlett Beamforming and Capon technique in DOA estimation based on actual measured data is presented. The data were captured using the synthetic planar array antenna in a typical outdoor environment where the received signal frequency is centered at 870 MHz. C++ programming language was used to develope the Capon algorithm.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

One of the main signal processing function of arrays of sensors is to detect the presence of one or more radiating point sources. Capon method aim at producing a high resolution estimate of the spatial frequency power spectrum of the signal field incident on the array of sensors. We mean an array here as a group of sensors located at different points in space which is assigned to measure a propagating wavefield such as radio wave. Array signal processing is a specialized branch of signal processing that focuses on signals from the source to the array conveyed by propagating waves. One practical problem in array signal processing is to extract the directions of arrival (DOA) of signals. As shown in figure 1, an array samples the wavefield incident on an array at time instant t.

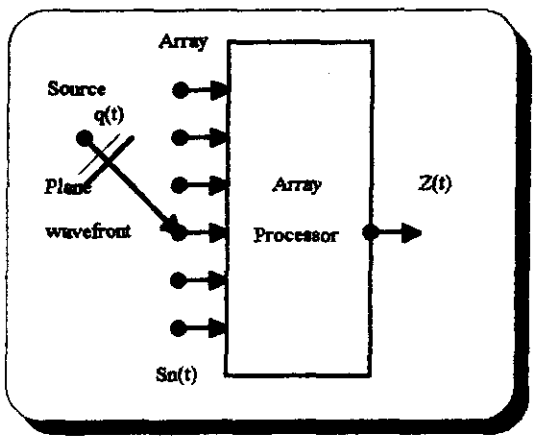

Figure 1.1: An illustration showing an array that samples a wavefield in space. The received signals are then processed by the signal processing algorithm to achieve the aim.