

NEW METHOD OF EFFECTIVE ARRAY FOR 2-D DIRECTION-OF-ARRIVAL ESTIMATION

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ABSTRACT. *This paper presents an effective antenna array based on MUSIC algorithm for two-dimensional direction-of-arrival estimation of multiple narrow-band sources impinging on the far field of the antenna array. Compared with the previous work, the proposed array can improve the performance of MUSIC algorithm, such as it can resolve the incoming rays with very close azimuth angles or very close elevation angles. In addition, the pairing of the estimated azimuth angles and elevation angles is automatically determined.*

Keywords: Antenna array, MUSIC, Direction-of-arrival, Azimuth angle, Elevation angle

1. Introduction. In wireless communications, the problem of estimating the two-dimensional (2-D) direction-of-arrival (DOA), namely, the azimuth and elevation angles, of multiple sources have received considerable attention in the field of array processing [1-10]. For 2-DOA estimation problem, we need a planar array to estimate a pair of parameters. Since a plane has two dimensions, there are many possible array geometries; some of them are illustrated in Figure 1. The natural extension of a uniform linear array (ULA) in two dimensions is two-parallel-ULA. The two-parallel-ULA has been discussed in literatures [1,2]. The triangular array, cross array, and circular array have been also addressed in literatures [3-10], respectively. However, using the above antenna arrays to estimate 2-D DOA exists some disadvantages, such as

(1) The array manifold is complex, so it is more difficult to modify the antenna array response.

(2) Few number of source can be detected by them.

The objective of the paper is to improve performance of MUSIC algorithm for 2-D DOA estimation by utilizing an especial antenna array. The outline of the paper is organized as follows, Section 2 introduces the data model received by a L-shape array. The MUSIC algorithm based on the L-shape array is developed in Section 3. In Section 4, some simulation results and performance analysis are presented. Section 5 provides a concluding remark to summarize the paper.