Abstract

In practice, the knowledge of the desired steering vector can be imprecise due to estimation errors in the direction of arrival (DOA) of the desired signal or imperfect array calibration. In these situations, the performances of the conventional adaptive beamformers are known to degrade substantially. In this paper, an effective method for designing a robust adaptive beamforming is presented. This method is based on Woodward-Lawson array design method, where the main beamformer in the upper channel is designed to form a main lobe with high gain in the direction of desired signal while the blocking structure in the lower channel is designed to form a wide and deep null toward and around the direction of desired signal. By generating this wide null, the proposed method provides robustness against arbitrary mismatches in the desired signal steering vector. Simulation results in ideal situations (where the desired signal steering vector is known exactly) and in more realistic situations with signal steering vector errors are presented to illustrate the performance of the proposed method.

Index Terms

Computer Science Signal Processing
Keywords

Adaptive Beamforming, Woodward-Lawson array design, Direction-of-arrival mismatch, desired signal cancellation