ADAPTIVE NULLING OF MINOR LOBES IN ARRAY ANTENNA PATTERNS USING MATLAB

A Project Abstract

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Abstract:

This project focuses on the development and implementation of an innovative technique to nullify minor lobes in array antenna patterns using MATLAB. The primary objective is to enhance the directional characteristics of the antenna system by suppressing undesired radiation in secondary directions.

The study employs a comprehensive set of signal processing and optimization algorithms to dynamically adjust the weights of individual array elements, thereby mitigating the impact of minor lobes   The methodology involves the detailed simulation of array antenna patterns, rigorous analysis of minor lobe characteristics, and the application of advanced mathematical techniques to optimize the array element weights. MATLAB serves as the primary tool for modelling, simulation, and algorithm implementation. The project explores a range of algorithms, including traditional beam forming, adaptive beam forming, and convex optimization methods, comparing their effectiveness in achieving minor lobe nulling.

Key findings highlight the successful implementation of the proposed technique, demonstrating a significant reduction in minor lobe levels and an overall improvement in antenna performance. The project contributes valuable insights into the application of various signal processing methods, such as adaptive filtering and convex optimization, for antenna pattern optimization.

The results of this study carry practical implications for antenna design and deployment in communication systems, radar systems, and wireless networks. Minimizing undesired radiation is critical for enhancing signal quality and overall system efficiency. The research underscores the potential of MATLAB as a powerful tool for antenna engineers and researchers in the field of array signal processing.

This work not only provides a practical solution to the challenge of minor lobe suppression but also sheds light on the comparative effectiveness of different algorithms in the context of array antenna optimization.

Keywords:

Array Antenna Patterns, Minor Lobes, MATLAB, Signal Processing, Optimization Algorithms, Directional Characteristics, Antenna System, Undesired Radiation, Simulation, Beam Forming, Adaptive Beam Forming, Convex Optimization, Array Element Weights, Modelling, Algorithm Implementation, Antenna Performance, Adaptive Filtering, Communication Systems, Radar Systems, Wireless Networks, Signal Quality, System Efficiency, Array Signal Processing, Antenna Engineers,

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