Null Steering Optimization Based MVDR Beamformer Using Hybrid PSOGSA Approach for Antenna Array System

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***Abstract*—The technology of smart or adaptive antenna for mobile communications has received huge interest worldwide in recent years. Using dynamically adaptive beampattern, a smart antenna can eliminate interference signals, increase the system capacity and the spectrum efficiency. Beamforming is the process of forming beams towards the direction of the real user while simultaneously suppressing signals origination from other directions. In this work, interference reduction one of the major problem in wireless communication system, thus, hybrid Particle Swarm Optimization and Gravitational Search Algorithm (PSO-GSA) approach is one of the modern hybrid metaheuristic optim-ization algorithm applied to the smart antenna system. Minimum variance distortionless response (MVDR) integrated with hybrid PSOGSA approach to enhance the MVDR performance by contr-olling the complex excitation weight coefficients basing linear antenna array radiation pattern synthesis. The performance of the proposed MVDR$_{PSOGSA}$ method is assessed based on various QoS criteria such as beampattern accuracy for azimuth and elevation scanning angles and SINR output. The results reported here have been compared with the results of conventional MVDR technique. It is found that the SINR and output beampattern are in good agreement with MVDR$_{PSOGSA}$. The proposed approach successfully used to determine the excitation weight coefficients of the linear antenna arrays to produce the shaped-beam pattern-s and to introduce deep nulls at prescribed unwanted directions. This work proposes a novel method to implement in the wireless communication system to eliminate the multiple access interfere-nce source.**

Keywords—Beamforming; Linear Antenna Array; Minimum Variance Distortionless Response, SINR, Smart Antenna