Single-Port Beamforming Algorithm for 3-Faceted Phased Array Antenna

Nurul H. Noordin, Tughrul Arslan, Brian W. Flynn, Ahmet T. Erdogan, and Ahmed O. El-Rayis

Abstract—The implementation cost of a phased array antenna is high due to the large number of RF components required in the system. Migrating from the multiport beamforming system to a single-port beamforming system is a promising alternative. In this letter, a novel single-port beamforming algorithm using the pseudo-inverse function is proposed. The signal received at each element is estimated from the combined signal that is generated by the single-port output system. With the estimated values, the array weight is then calculated for the desired radiation pattern. The single-port concept is implemented on a 3-faceted antenna array and simulated in MATLAB. The results show that adaptive beamforming can be achieved with the estimated signals, and this technique has a faster execution time compared to a multiport beamformer. With reduced component count and implementation cost, the proposed technique demonstrates potential for commercial deployment in the mobile communication industry.

Index Terms—3-faceted array, pseudo inverse, single-port beamforming.