ABSTRACT

The performance of adaptive antennas is studied for planar arrays with a circular aperture. The aperture has the restriction of a half-wavelength radius at the center frequency. The arrays consist of seven antenna elements. The performance is compared for various antenna element distributions. Distribution types include having the elements placed throughout the aperture as well as having all antenna elements placed around the perimeter of the aperture. In this thesis, it is shown that if the array requires an element at the center of the aperture, then the other six antenna elements should be distributed around the perimeter of the aperture. Nonuniform spacing of the six antenna elements around the perimeter of the aperture increases the performance of the array. It is also shown if the array does not require an element at the center of the aperture, then all seven antenna elements should be placed along the perimeter of the aperture. For all the elements on the perimeter of the aperture, antennas with uniform or nonuniform spacings between elements yields similar performance. Another important contribution of this study is that we observed that the performance of space-only adaptive arrays in the presence of CW signals is similar to space-time based adaptive arrays in the presence of wideband signals. Thus, one could significantly reduce the computational time required to compare the performance of various antenna element distributions. One would only have to simulate the

performance of the various distributions with space-only processing in the presence of CW signals.