Problem Set # 4.0
ECE-595, Fall 2006
Spatial Array Processing
University of New Mexico, Albuquerque

Date Assigned : 10/04/2006
Date Due : 10/10/2006

In class we looked at the minimum variance beamformer as the solution to a constrained optimization problem. Our goal in this exercise is to compare the performance of the minimum variance beamformer to that of the conventional beamformer. We will specifically use the ULA framework introduced before.

1. For a plane-wave propagating at $\phi_o = 30\circ$ and $L = 4$, $N = 20$, $d = \frac{\lambda}{2}$, $\sigma_a^2 = 1$, $\sigma_n^2 = 0.1$, compare the two approaches in terms of their average power estimate. What can be said about the side lobes of approaches.

2. Compare the performance of the algorithms for two sources propagating at $\phi_{1,2} = 10^\circ, 45^\circ$.

3. Under what conditions are the two beamforming approaches theoretically the same.

4. Compare the performance of the two beamforming approaches for different number of snapshots.