OBJECTIVE

To investigate methods used for covariance estimation in adaptive antenna arrays with a focus on applicable Eigen structure methods is as

- The space spanned by eigenvectors may be partitioned into two subspaces
  - Signal subspace
  - Noise subspace

- The steering vectors corresponding to the directional sources are orthogonal to the noise subspace
  - noise subspace is orthogonal to signal subspace thus steering vectors are contained in the signal subspace

- When explicit correlation matrix is required it may be estimated from the samples.

The more important part is the adaptive algorithms, which will determine the speed of convergence and hardware complexity required. The algorithms include Least Mean Squares algorithm (LMS), Normalized Least Mean Square algorithm (NLMS), Estimation of Signal Parameters via Rotational Invariance Techniques algorithms (ESPIRT) and Multiple Signal Classification (MUSIC). The notion of partially adaptively then explained which the alternative technique is when the number of array elements becomes very large until it is difficult to implement full adaptively. Another important component in adaptive beam forming is the reference signals, also known as the prior knowledge of the signal of interest, which is needed to decrease the complexity, improve accuracy and achieve faster convergence.

The main objective of the research is on directing the beam towards the desired target in a particular direction while successfully rejecting all other targets in unwanted directions.