Substituting eq"12 in to eq"11 result in eq"13

$$w(n+1) = w(n) + 2\mu[r_{xd} - R_{xx}w(n)]] \quad (13)$$

Where μ is step size parameter. It is a real valued positive constant generally less than one. The initial weight $w(0)$ is assumed to be zero. The successive corrections of the weight vector eventually leads to the minimum value of the mean squared error. The step size varies from 0 to λmax, whereλ max is the largest Eigen value of the correlation matrix R[8].

Substituting the value of r_{xd} andR_{xx} in to eq"13 result in eq"14.

$$w(n+1) = w(n) + 2\mu E[x(n)e^*(n)] \quad (14)$$

6. SIMULATION RESULTS

For simulation purposes the uniform linear array with M number of element and input signal is modulated by using BPSK modulation is considered, simulation of LMS algorithm is carried out using MATLAB to illustrate how various parameters such as number of antenna element, inter element spacing ,number of interferes and variation in SNR parameter affect the beam formation and convergence of the algorithm.

6.1 General case

Consider that the desired user is arriving at an angle of 30 degree and an interfere user at an angle of -50 degree. The spacing between the individual element is half wavelength and the signal to noise ratio(SNR) is 30db.

The array factor for 8 element antenna antenna array is computed.Figure.4.Shows rectangular array factor plot for different angle of arrival. Figure.5.Shows polar array factor plot for different angle of arrival
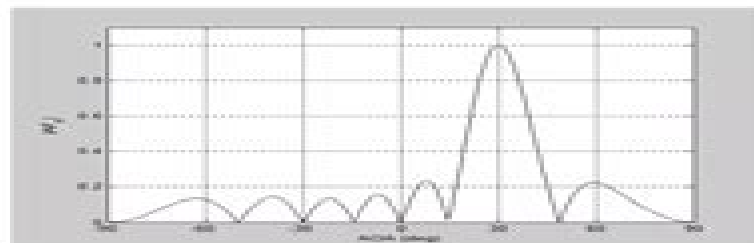
Fig-4: Array factor plot when desired user is 30degree and the interfere is -50degree
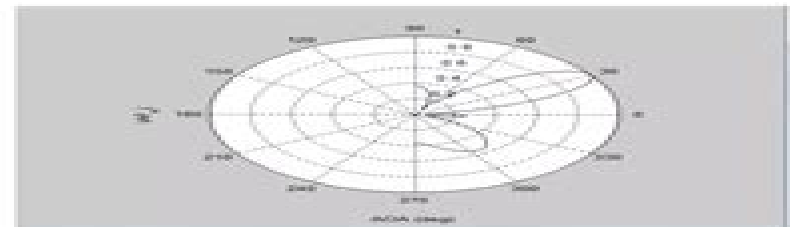
Fig-5: Polar array factor plot when desired user is 30degree and the interfere is -50degree

The optimum complex weights in the case for which the algorithm converges is as follows.
w1 = 1.
w2 = 0.039512+0.97006i
w3 = -1.0194+0.03523i
w4 = -0.001461-0.98315i
w5 = 0.98244-0.051033i
w6 = 0.018318+1.0197i
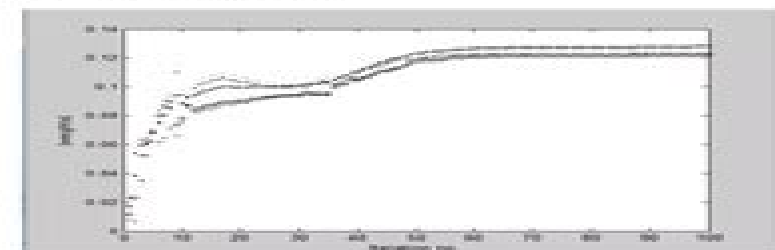w7 = -0.97044+0.012622i
w8 = -0.052976-0.99924i

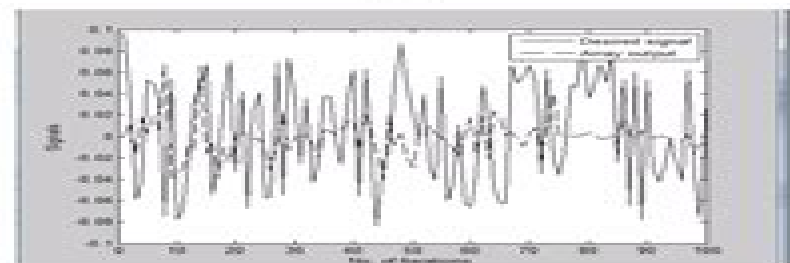**Fig-5:** Magnitude of array weights when no.of array element is 8.

Fig-6: Acquisition and tracking of desired signal and actual array output

Adaptive Beamforming Using Lms Algorithm

Gary F. Hatke,Stuart C. Schwartz,PRINCETON UNIV NJ INFORMATION SCIENCES AND SYSTEMS LAB.

Adaptive Beamforming Using Lms Algorithm:

    Adaptive Beamforming with the Transform Domain LMS Algorithm Krzysztof Z. Siejko,1987 *Smart Antennas* Lal Chand Godara,2004-01-27 The use of smart antennas to increase mobile communications channels has re ignited research and development in the field Practicing engineers are eager to discover more about this subject and need a comprehensive book that can provide a learning platform and prevent the loss of time spent on searches through journal literature Smart Antennas examines nearly all aspects of array signal processing and presents them in a logical manner It delivers a detailed treatment of antenna array processing schemes adaptive algorithms to adjust weighting direction of arrival DOA estimation methods diversity combining methods that combat fading and reduce errors The book introduces the various processor structures suitable for the narrowband field examining the behavior of both element space and beamspace processors It then explores adaptive processing focusing on the simple matrix inversion algorithm constrained least mean squares LMS the neural network approach and more The text also describes smart antennas that are suitable for broadband signals and presents analyses and techniques suitable for correlated fields in narrowband and broadband signals This volume supplements its content with extensive references enabling you to further investigate smart antenna array schemes and application *Mobile Computing: Concepts, Methodologies, Tools, and Applications* Taniar, David,2008-11-30 This multiple volume publication advances the emergent field of mobile computing offering research on approaches observations and models pertaining to mobile devices and wireless communications from over 400 leading researchers Provided by publisher

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