spectrum, good performance of transmission, and relative simplicity in modulation and demodulation. Owing to the aforementioned advantages, MIMO communication systems employing high throughput QAM signals have found widespread applications.

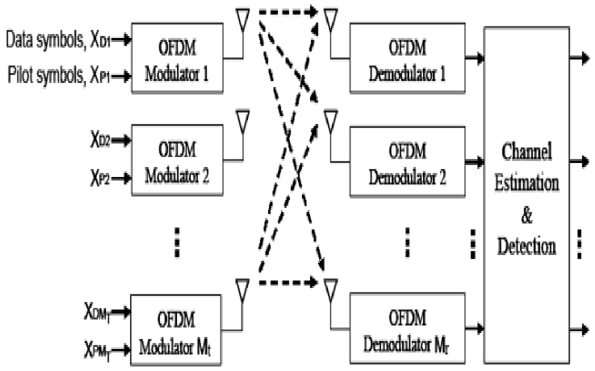


Figure 2: MIMO-OFDM System

2. Modified Newton Method

To ensure that the tap weights rapidly converge to the optimum value, we propose a novel MNM. Give an objective function $f(x)$, where **x** is a vector variable. Assume that the gradient of $f(x)$ can be decomposed into the following form

$$\nabla f(x) = A(x)x - b(x) \qquad (1)$$

where $A(x)$ and $b(x)$ are a positive definite matrix function and a vector function with respect to **x**, respectively. Let a search direction $\mathbf{d}_k$ be described by

$$d_{k'} = X_{k'-1} - A^{-1}(X_{k'-1})b(X_{k'-1}) \qquad (2)$$

Where k' is the iterative index.

$$w_{n,d,k+1} = w_{n,d,k} + \mu SDDP_K X(k) \frac{\sum_{q=1}^{4} I(y_n I(k) - s_q)\exp(-|y_n(k) - s_q|^2/2\sigma^2)}{\sum_{q=1}^{4}\exp(-|y_n(k) - s_q|^2/2\sigma^2)} \qquad (3)$$

3. Performance Analysis

In the MIMO system, we are more apt to display the MSE, SER and MD of all N users rather than the individual user's performance. The MSE, SER and MD are respectively defined as

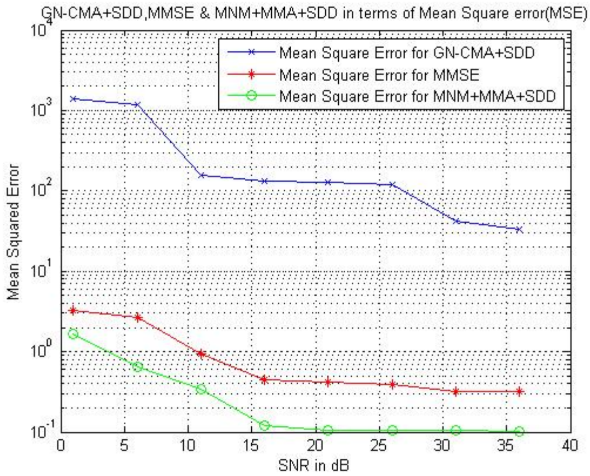
$$MSE = \frac{1}{N}\sum_{n=1}^{N} MSE_n \qquad (4)$$

$$SER = \frac{1}{N}\sum_{n=1}^{N} SER_n \qquad (5)$$

$$MD = \frac{1}{N}\sum_{n=1}^{N} MD_n \qquad (6)$$

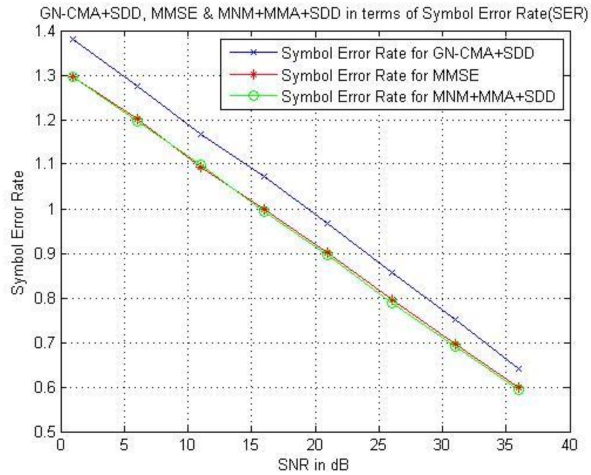
4. Simulation Results

4.1 MSE along with SNR



The performance of Mean Square Error for GN-CMA+SDD, MMSE and MNM+MMA+SDD

4.2 SER along with SNR



The performance of Symbol Error Rate for GN+CMA+SDD, MMSE and MNM+MMA+SDD

5. Conclusion

The MNM is quadratically convergent. A novel MMA+SDD+CF has been introduced for improving the performance symbol error rate. It has high computational precision. Combination with novel MNM the algorithmic complexity is reduced obviously. However, the computational complexity of the proposed method will increase with the increasing of the order of QAM signal, while that of the other methods remains nearly unchanged.

References

[1] G.Lohitha,M.VijayaLakshmi,Dr.K.RamaLingaReddy, "Performance Evaluation of Training Based Channel Estimation in MIMO-OFDM Wireless System", International Journal on Recent and Innovation Trends in Computing and Communication, 8 August 2014

[2] Satya N. Atluri, Chein-Shan Liu, Chung-Lun Kuo," A MODIFIED NEWTON METHOD FOR SOLVING

NON-LINEAR ALGEBRAIC EQUATIONS", *Journal of Marine Science and Technology, Vol. 17,2009.*

[3] R.S.Ganesh, Dr. J.Jaya Kumari," A Survey on Channel Estimation Techniques in MIMO-OFDM Mobile Communication Systems", International Journal of Scientific & Engineering Research, Volume 4, Issue 5,May-2013.

[4] Aida Zaier1 and Ridha Bouallègue," CHANNEL ESTIMATION STUDY FOR BLOCK –PILOT INSERTION IN OFDM SYSTEMS UNDER SLOWLY TIME VARYING CONDITIONS" International Journal of Computer Networks & Communications (IJCNC) Vol.3, No.6, November 2011.

[5] S. Chen and L. Hanzo, "Fast Converging Semi-Blind Space-Time Equalisation for Dispersive QAM MIMO Systems",IEEE TRANSACTIONS ON WIRELESS COMMUNICATIONS, VOL. 8, AUGUST 2009 .

[6] Kenneth Kreutz-Delgado, Yogananda Isukapalli*,"* Use of the Newton Method for Blind Adaptive Equalization Based on the Constant Modulus Algorithm", IEEE TRANSACTIONS ON SIGNAL PROCESSING, VOL. 8, AUGUST 2008 .