

## **Abstract**

**“ADAPTIVE TECHNIQUES FOR V-BLAST LIKE  
RECEIVERS FOR MIMO SYSTEMS”**

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Wireless systems with multiple antenna configurations has recently emerged as one of the most significant technical breakthroughs in modern communications. However, because of the extremely random nature of the wireless channels, we have to use modern equalization methods in order to defeat the signal degradation. Adaptive equalization at the receiver of the telecommunication system can be used to compete this dynamic nature of the wireless channel and track the changes of its characteristics. Furthermore, nonlinear decision feedback methods are necessary for the cancellation of the intersymbol interference which occurs with these systems.

This work involves with adaptive equalization methods at the receiver of the telecommunication system. We use the following adaptive algorithms so as to minimize the error : the Recursive Least Squares algorithm (RLS), the iterative Conjugate Gradient algorithm (CG) and the iterative Modified Conjugate Gradient algorithm (MCG). When these algorithms are used with linear methods, they give very slow converge and high final error. So, it is necessary to use nonlinear equalization methods in order to succeed fast converge rate and deal with the increased intersymbol interference for MIMO systems.

Firstly we use the generalized decision feedback method (GDFE), and then the modern method of ordered successive cancellation method (OSIC or V-BLAST). Based on the emulations we conclude that the last method succeed the lower error, but with high computational cost. Furthermore, we can't use OSIC method with Modified Conjugate Gradient algorithm.

In this work, we describe a specific implementation of the OSIC method which uses RLS algorithm with low computational complexity. So we generalize its usage with the Conjugate Gradient algorithms. Finally, we conclude that we can't also use MCG with OSIC method with low computational complexity. In order to construct an OSIC system based on Conjugate Gradient algorithm, the algorithm must not operate on time basis, like basic Conjugate Gradient algorithm does.