

CROSS-RELATION-BASED FREQUENCY DOMAIN BLIND CHANNEL ESTIMATION FOR MIMO COMMUNICATION SYSTEMS

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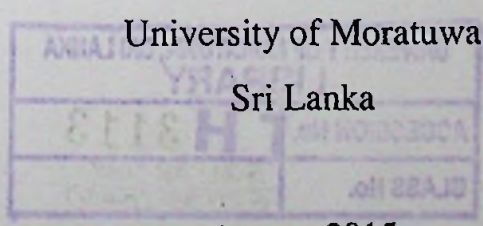
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ABSTRACT

Blind channel estimation is attractive for the application of in high-speed wireless communication systems due to its high spectral efficiency. Most of the conventional blind channel identification algorithms are based on the statistical properties of the transmitted signals. However, in practical communication systems, the statistical model of the transmitted signals may not be known or there may not be sufficient data to estimate the statistical properties. Alternatively, we can use Cross Relation (CR) principle for computationally-efficient blind channel estimation. CR principle-based frequency domain blind channel estimation schemes offer good performance when the data length is inevitably short. In this thesis, a frequency-domain CR-based blind channel estimation schemes are developed for both single-carrier and multicarrier multiple-input multiple-output (MIMO) systems. The proposed channel estimation scheme is able to identify the channel using a single received signal block. This channel estimation scheme is accompanied by a simple block pre-coding scheme. The channel is assumed time invariant within the signal block period which depends on the antenna configuration of the system. The numerical simulation shows that the proposed methods perform satisfactorily with only one or very few received signal blocks, with compared to existing correlation based methods which require more data blocks.

Keywords –MIMO, SVD , CR, Channel Estimation



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LIST OF ABBREVIATIONS

| Abbreviation | Description |
|--------------|--|
| MSE | Mean Squared Error |
| SNR | Signal to Noise Ratio |
| FFT | Fast Fourier Transform |
| CR | Cross Relation |
| SISO | Single Input Single Output |
| SIMO | Single Input Multiple Output |
| MISO | Multiple Input Single Output |
| MIMO | Multiple Input Multiple Output |
| OFDM | Orthogonal Frequency Division Multiplexing |
| SVD | Singular Value Decomposition |
| AWGN | Additive White Gaussian Noise |
| BER | Bit Error Rate |

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