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Minimizing the Effects of Inter-Carrier Interference Signal in OFDM System Using FT-MLE Based Algorithm

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Abstract Orthogonal-frequency-division-multiplexing (OFDM) systems suffer from Inter-carrier interference (ICI) when the orthogonality between subcarriers is lost. The orthogonality between subcarriers is lost due to two factors. The first is the Doppler-frequency shift in the subcarriers due to the relative motion between the transmitter and receiver. The second is the miss-synchronizations between the local oscillators in the receivers and the received OFDM signal. This paper proposes two methods to reduce the variance of the ICI signal. The first method uses a Fourier-transform based maximum-likelihood estimator (FT-MLE) to estimate the Doppler-shift in the channel. The receiver estimates the frequencies of the subcarriers by estimating the parameters of pilot signal and exploiting the strong relation between the subcarriers in the OFDM signal. The second methods depends on decreasing the value of the normalized Doppler shift by increasing the OFDM symbol rate. No estimation for the Doppler shift is required in this method.

1 Introduction

OFDM is widely used in many communication systems [1]. Actually, the revolution in the applications of the cellular phones, Internet, and satellite communications in the last few years increases the demand on high-data-rate communication systems [2]. OFDM is a wide-band communication system, which supports high-data-rate transmissions [3]. OFDM is used for many telecommunications and wireless standards [4]. OFDM is used in

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