

# Low Complexity I/Q Imbalance and Channel Estimation Techniques for MIMO OFDM Systems

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**Abstract**—Due to the requirement of low computational complexity and low power consumption, the direct-conversion receivers have drawn a lot of attentions and exhibited great advantages in the next-generation wireless communication systems. However, some gain and phase mismatches in direct conversion receiver can seriously degrade the system performance. One of these mismatches is so-called the in-phase and quadrature-phase (I/Q) imbalance which is induced by the mismatch of local oscillators.

In this paper, we propose a data-aided method which focuses on the estimation and compensation of the I/Q imbalance and multipath channel effects of MIMO OFDM system over the wireless Rayleigh fading channels. A novel preamble design, i.e., MIMO full-usage preamble sequence design, can jointly estimate the gain and phase parameters of I/Q imbalance and the channel impulse response (CIR). On one hand, by using the proposed preamble sequence, the parameters of I/Q imbalance and CIR can be accurately estimated and the image interference signal can be eliminated. On the other hand, it can equalize the received signal to detect the original transmitted data.

Simulation results confirm the proposed method with low computational complexity can accurately estimate the CIR and I/Q imbalance parameters, and provide low bit error rate (BER) performance over RF impairment and channel effect environments.

**Keywords**—MIMO-OFDM, I/Q imbalance, channel estimation.



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