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Efficient joint carrier offset and channel estimator for T-OFDM system

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Abstract:

The high sensitivity of multicarriers systems to the channel estimation errors, transceiver oscillators mismatch and/or Doppler effect has received a considerable attention in the recent studies. In this work, a new two semi-blind and data-aided techniques are proposed to achieve an accurate carrier frequency offset (CFO) and flat fading channel estimation in the orthogonal frequency division multiplexing (OFDM) based T-transform (T-OFDM) system. The semi-blind is utilised only two trial values to achieve joint CFO and channel estimation. Also, a new data-aided CFO estimator over the additive white Gaussian noise is proposed. The two proposed techniques are based on a low computational complexity T-transform, which was developed formally to combine the Walsh-Hadamard transform and inverse discrete Fourier transform into a single unitary transform. The unique butterfly structure of the T-transform can be exploited in the semi-blind joint CFO and channel estimator by utilizing only two trial samples from the T-OFDM symbol. This technique is able to estimate the CFO mismatch and the flat fading channel varying in every transmitted frame. The main advantages of the proposed techniques over the existing schemes are lower computational complexity, lower data rate losses, and an accurate estimation for the fine CFO and the coefficients of the flat fading channels.

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