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Implementation of particle swarm optimization based ICF technique to reduce the PAPR of ACO-OFDM

Abstract

Orthogonal frequency division multiplexing (OFDM) is advantageous in terms of the spectral efficiency it offers. However, in OFDM, the bandwidth-efficient multicarrier modulation (MM) is limited by the peak-to-average power (PAPR) problem. Iterative clipping and filtering (ICF) method has been used in this work to address such issue. The ICF is regarded as a practical scheme that has become widely accepted and used due to the fact that it is characterized by low computational complexity. This method is also easily implemented, characterized by non-expansion of bandwidth, and it does not require the support to the receiver side during implementation. Nevertheless, the significant of this work is on further improvement where the method involves the iterative clipping of the same signals with a fixed clipping threshold (CT) in every clipping operation. Particle swarm optimization based ICF-OFDM, which is proposed in this research work, literally finds the most suitable clipping ratio, that eventually solves the problem of output power instability. Subsequently, the proposed method is implemented with asymmetrical clipped optical OFDM (ACO-OFDM) to validate the proposed method through the use of Matlab simulation. The PAPR reduction of the proposed method is then compared with the PAPR of the Hartley transform (DHT)-based ACO-OFDM and the traditional ACO-OFDM and DCO-OFDM. The best BER performance has been investigated via two modulation index. Results indicate that our method outperforms the counterparts in term of PAPR reduction and BER performance.

Keywords

ACO-OFDM; DCO-OFDM; ICF; OFDM; PAPR; PSO