PEAK TO AVERAGE POWER RATIO REDUCTION OF MULTICARRIER TRANSMISSION SYSTEMS USING ELECTROMAGNETISM-LIKE METHOD

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ABSTRACT. *In this paper, a reduced-complexity partial transmit sequences (PTS) scheme is proposed to resolve the intrinsic high peak-to-average power ratio (PAPR) problem of multi-carrier transmission systems signal with low computational complexity. The conventional PTS technique is highly successful in PAPR reduction for multi-carrier transmission systems signals, but the considerable computational complexity for the required search through a high-dimensional vector space is a potential problem for practical implementation. To reduce the search complexity while still improving the PAPR statistics, stochastic optimization techniques such as the simulated annealing (SA) algorithm, genetic algorithm (GA) and particle swarm optimization (PSO) have recently been proposed to search for a phase factor that reduces both the PAPR statistics and the computational load. In this paper, a novel stochastic optimization approach, that is, the electromagnetism-like (EM) algorithm is applied in reducing the PAPR of a multi-carrier transmission systems signal. From the results, it can be seen that a proposed scheme based-iterative PTS can be easily implemented with low combining complexity, still maintaining a better BER performance, compared to the conventional PTS approach. Simulations have been conducted and the results show that the BER performance of the investigated EM-PTS is increased by minimizing the signal's nonlinear distortion caused by HPA.*
Keywords: Multi-carrier transmission systems, Peak-to-average power ratio, Partial transmitting sequence, Electromagnetism-like method

1. **Introduction.** Multi-carrier code division multiple-access (MC-CDMA) communication systems have emerged recently as a promising candidate for next generation broadband mobile networks [1-4]. However, there are still some challenging issues remained unresolved in the design of the MC-CDMA. One of the major problems is high peak to average power ratio (PAPR) of transmitted MC-CDMA signals. Therefore, the MC-CDMA receiver's detection efficiency is very sensitive to the nonlinear devices used in its signal processing loop, such as high power amplification, digital-to-analog converter, which may severely impair system performance due to induced spectral re-growth and detection efficiency degradation. Thus, PAPR reduction technique plays an important role in multi-carrier transmission systems. Various methods for reducing PAPR have been proposed for MC-CDMA system, such as deliberate clipping [5], partial transmit sequences [6-9], block coding [10], code selecting [11], selective mapping (SLM) [12,13] and