Abstract

Constant envelope orthogonal frequency division multiplexing (CE-OFDM) techniques have been recently proposed to allow the use of power-efficient saturated amplifiers, since those signals do not have the high peak-to-average ratio of OFDM signals, but maintain most of the OFDM advantages. However, the nonlinear nature of the phase modulation process inherent to CE-OFDM schemes gives rise to both theoretical challenges (analytical difficulties due to the nonlinear processes involved) and practical challenges (spectral widening and possible performance degradation due to nonlinear distortion effects). In this work, we present accurate expressions for the average power spectral density of CE-OFDM signals. Making use of recent results that indicate performance gains associated to the optimum detection of nonlinearly distorted multicarrier signals, we also investigate the optimum detection of CE-OFDM signals considering both additive white Gaussian noise channels and frequency-selective channels with Rayleigh fading, providing theoretical expressions for the asymptotic gains as well as the correspondent approximate bit-error-rate results.