**A Piecewise Linear Companding Transform for PAPR Reduction of OFDM Signals With Companding Distortion Mitigation**

**ABSTRACT**

Companding is a well-known technique for the peak-to-average power ratio (PAPR) reduction of orthogonal frequency division multiplexing (OFDM) signals. However, as companding transform is an extra operation after the modulation of OFDM signals, companding schemes reduce PAPR at the expense of increasing the bit error rate (BER). In this paper, a new piecewise linear companding scheme is proposed aiming at mitigating companding distortion. In the design of the companding transform, we study the theoretical characterization of companding distortion. It demonstrates that companding larger signals with smaller amplitude increments are more favorable in reducing companding distortion. Based on the analysis results, a new piecewise linear companding transform is proposed by clipping the signals with amplitudes over a given companded peak amplitude for peak power reduction, and linearly transforming the signals with amplitudes close to the given companded peak amplitude for power compensation. With the careful design of the companded peak amplitude and the linear transform scale, the proposed transform can achieve enhanced BER and power spectral density performance, while reducing PAPR effectively. Index Terms—OFDM, PAPR, companding transform, companding distortion.