

Zero-Crossing Precoding

Abstract

Systems with 1-bit quantization and oversampling are promising for the Internet of Things (IoT) devices in order to reduce the power consumption of the analog-to-digital-converters. The novel time-instance zero-crossing (TI ZX) modulation is a promising approach for this kind of channels but existing studies rely on optimization problems with high computational complexity and delay. In this work, we propose a practical waveform design based on the established TI ZX modulation for a multiuser multi-input multi-output (MIMO) downlink scenario with 1-bit quantization and temporal oversampling at the receivers. In this sense, the proposed temporal transmit signals are constructed by concatenating segments of coefficients which convey the information into the time-instances of zero-crossings according to the TI ZX mapping rules. The proposed waveform design is compared with other methods from the literature. The methods are compared in terms of bit error rate and normalized power spectral density. Numerical results show that the proposed technique is suitable for multiuser MIMO system with 1-bit quantization while tolerating some small amount of out-of-band radiation.