Comparative Stability Analysis of High-Order Amplitude-Discretized Signaling Under AWGN

High-order amplitude-discretized signaling provides a framework for mapping unique amplitude levels directly to symbolic information. This study investigates the stability of such amplitude-based symbol representations under additive white Gaussian noise (AWGN), focusing on the tradeoff between symbol density and noise resilience. By considering schemes with varying numbers of amplitude levels, we analyze the conditions under which reliable symbol discrimination is maintained. Simulation-based observations identify amplitude ranges and operating conditions where high-density signaling remains robust against noise-induced errors. The findings offer practical insights for designing reliable amplitude-discretized signaling systems, highlighting considerations for information density, stability, and potential applications in computational intelligence and adaptive signal processing. This work emphasizes the feasibility of human-readable symbolic communication using amplitude discretization, providing a foundation for further exploration of high-order signaling paradigms.

Keywords: Amplitude discretization, AWGN, high-order signaling