INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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SHORT ABSTRACT

Chaotic signals are unstable and aperiodic, making them naturally harder to identify and predict. It has wideband characteristic, it is resistant against multipath fading and it offers a cheaper solution to traditional spread spectrum systems. In this thesis, the performance of differential chaos shift keying (DCSK) modulation is analyzed in different wireless communication scenarios. First, a relay selection based DCSK cooperative diversity scheme, namely DCSK selection relaying (DCSK-SR) scheme is proposed. The relay which maximizes the total received signal-to-noise ratio (SNR) at the destination is selected from a multiple multiple-input multiple-output (multiple MIMO) relay cluster to cooperate with the source node. Mathematical expression for the probability density function (PDF) of SNR for each hop and end-to-end bit error rate (BER) is derived. Secondly, a spectrum and energy efficient DCSK bidirectional relaying (DCSK-BDR) scheme is proposed in which two source nodes exchange their information through a relay node. The end-to-end BER expression for the DCSK-BDR scheme is derived. Thirdly, DCSK modulation based transmit antenna selection (TAS) schemes are proposed to reduce the effect of signal fading with less hardware complexity at the receiver. Based on receiver structure/specifications, DCSK-TAS, DCSK-joint antenna selection (DCSK-JAS) and DCSK-transmit antenna selection/equal gain combining (DCSK-TAS/EGC) schemes are proposed. BER and throughput of the proposed schemes are derived and evaluated over Nakagami-m fading channels. Finally, a high-data-rate DCSK scheme based on spatial modulation (SM), spatially modulated DCSK (SM-DCSK) is proposed. Analytical expression for the symbol error rate (SER) of the SM-DCSK scheme is derived. All the expressions derived in the thesis are validated by Monte Carlo simulation results.