Performance Analysis of Orthogonal Chaotic Signals in Digital Based Chaotic Communication Systems

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In spread spectrum communication systems, narrowband information signals are carried using chaos-based carrier signals featured with broad band structure. The high bandwidth of the carrier signal causes decreasing in the power spectral density while increasing in the bandwidth of the transmitted signal. This situation contributes to the storage of information signals in noise and to the transmission of reliable information. In this study, communication quality performance is inquired by investigating chaotic signals, which are main carrier of the chaotic based digital communication systems, and its effects on the bit error rates.

The study was performed using one of the digital-based chaotic communication systems which is Chaotic On-Off Keying (COOK). The results are compared for discrete and continuous signals using respectively, Henon-logistic map discrete chaotic generators, and Rössler-Sproot continuous chaotic generators. Bit error rates using continuous or discrete chaotic generators are similar in these studies. However, it is observed that the bit error rates are changed by the orthogonal structure of the signals rather than the continuous or discrete chaotic generator structure. Furthermore, the Rössler and Henon map chaotic generators with orthogonal structure have a low bit error rate compared to other chaotic constructions.

Keywords: Chaotic Communication, Orthogonal signal, bit error rate.

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