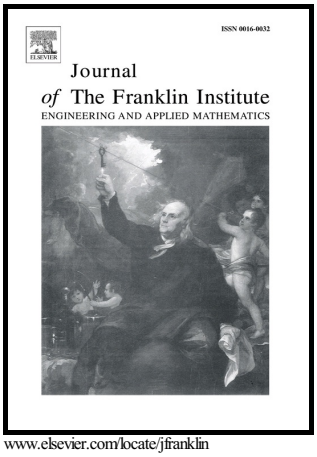

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Frequency-Translated Differential Chaos Shift Keying for Chaos-Based Communications

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Abstract

In this paper, an efficient, differential chaos shift keying (DCSK) method, known as frequency-translated DCSK (FT-DCSK), is proposed. Ordinary DCSK is difficult to incorporate using CMOS integrated circuits because of the long wideband delay line that is required to separate reference and data chaotic sequences into two time-shifted slots of each frame. Another disadvantage of DCSK is the repetition of chaotic sequence in reference and data slots, which decreases data security and bandwidth efficiency. In the proposed method, the usage of a delay line is avoided by frequency translation of the reference chaotic sequence over the frame time. Frequency translation is achieved by amplitude modulation of two orthogonal sine carriers with reference chaotic sequences. As a result, the FT-DCSK scheme avoids the usage of wideband delay lines and increases the bandwidth efficiency. The analytical expression for bit error rate (BER) performance is derived and compared with simulation results. Finally, the obtained performance results are compared with similar modulation schemes. The proposed FT-DCSK scheme exhibits promising performance based on BER results.

Index Terms

chaos, frequency-translated differential chaos shift keying (FT-DCSK), bit error rate (BER), delay line.