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Secure Digital Communication using Chaotic Symbolic Dynamics

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Abstract: One of the major hurdles in implementing chaotic communication schemes is the synchronization of chaotic systems. For the last two decades, numerous contributions of varying successes have been made by researchers from different disciplines for the synchronization of chaotic systems. Symbolic dynamics based synchronization method is shown to be capable of providing high quality synchronization (HQS), which is essential for reliable communication. In this work, using this method, a secure digital communication system is proposed. The well known piece-wise linear 1-D map such as tent map and Bernoulli shift map are used for this study. Since the information is dynamically encoded to the system, higher level of encryption can be obtained. Using numerical simulations, the performance of the proposed scheme is compared with that of the binary phase shift keying (BPSK) and chaotic shift keying (CSK) schemes. The theoretical expression for the bit error rate is derived for the new system and it is numerically evaluated for AWGN and frequency selective channels. The Results indicate that the proposed scheme yield similar performances as that of the BPSK system at high signal to noise ratios (SNRs).

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