A New Hidden Attractor Hyperchaotic System and Its Circuit Implementation, Adaptive Synchronization and FPGA Implementation

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Abstract: In this paper, a new hyperchaotic system with no rest point is presented and its basic properties such as divergence and convergence, rest points and instability, Lypunov exponents, and bifurcation are analyzed in detail. In the proposed system, some special features such as position controllability and multistability in periodic state are observed. The analog circuit realization of the proposed hyperchaotic system is also presented to validate the present theoretical study of the system. Furthermore, the adaptive synchronization of the proposed hyperchaotic system is demonstrated using a novel anti-synchronization methodology. This paper also presents the Field Programmable Gate Array based digital circuit realization of adaptive anti-synchronization methodology for the proposed hyperchaotic system. The digital circuit implementation is achieved by generating the VHDL code for the FPGA implementation in Matlab and Xilinx. The experimental results are provided to verify the feasibility and effectiveness of our proposed scheme.

Keywords: *hidden attractor; hyperchaotic system; circuit implementation; adaptive synchronization; FPGA implementation.*

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