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Exponential Chaotic Model for Generating Robust Chaos

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Abstract

Robust chaos is defined as the inexistence of periodic windows and coexisting attractors in the neighborhood of parameter space. This characteristic is desired because a chaotic system with robust chaos can overcome the chaos disappearance caused by parameter disturbance in practical applications. However, many existing chaotic systems fail to consider the robust chaos. This article introduces an exponential chaotic model (ECM) to produce new one-dimensional (1-D) chaotic maps with robust chaos. ECM is a universal framework and can produce many new chaotic maps employing any two 1-D chaotic maps as base and exponent maps. As examples, we present nine chaotic maps produced by ECM, discuss their bifurcation diagrams and prove their robust chaos. Performance evaluations also show that these nine chaotic maps of ECM can obtain robust chaos in a large parameter space. To show the practical applications of ECM, we employ these nine chaotic maps of ECM in secure communication. Simulation results show their superior performance against various channel noise during data transmission.

Keywords

Author Keywords: [Chaotic communication](#); [Electronic countermeasures](#); [Logistics](#); [Bifurcation](#); [Orbits](#); [Degradation](#); [Chaotic behavior](#); [chaotic system](#); [nonlinear system](#); [robust chaos](#); [secure communication](#)

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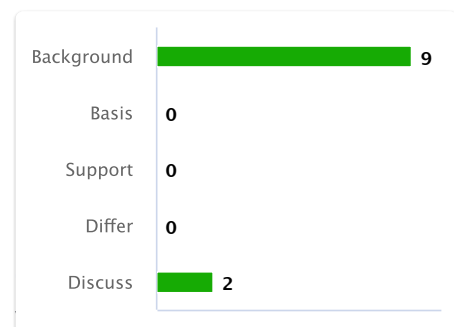
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