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NEW ALTERNATE RING-COUPLED MAP FOR MULTI-RANDOM NUMBER GENERATION*

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Abstract. An improved Lozi function with alternate coefficients has been proposed. The modifications in the model allow to remove the holes in the attractor which are not desirable, but appeared in the previous Lozi function; in this way, an everywhere dense attractor can be obtained. Moreover, the strong sensitivity to the type of binarisation (conversion of real values to 0 and 1) has been demonstrated; this conversion to binary numbers is instrumental to apply the NIST tests for randomness. The results have been validated and compared via NIST tests, for the different methods of quantization. Finally, is has been verified that the multi-random properties of the output signal have been improved thanks to the following strategies : under-sampling of the output signal, and the system order increasing.

Keywords. Nonlinear dynamical system, ring-coupled map, Lozi function, NIST tests, discrete-time map, dense chaotic attractor, pseudo random number generator.

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