Synthesis of Chaotic Systems

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Abstract: Scenario for the chaos synthesis was developed and tested. Namely, choose:

(i) A SISO (single-input single-output) dissipative (i. e. sum of its poles is negative) linear system of the third or higher order having hyperbolic (i. e. with nonzero real parts only), semistable (i. e. both positive and negative real parts are always present) poles.

(ii) Nonlinear static output feedback being odd and strictly monotonous function. The corresponding closed-loop system should have two additional nontrivial equilibria such that the appropriate approximate linearizations has again poles with properties of (i).

(iii) Zeros of the linear systems that are attracting and parametrized by the feedback gain according to the Root Locus Method.

It will be demonstrated that the nonlinear system synthetized according (i) - (iii) exibits chaotic behaviour (i. e. bounded nonstationary motion with sensitive dependence on initial data) for a wide range of its parameters.

Keywords:

AMS Subject Classification: