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Abstract–

Chaotic system with time-delayed couplings show two kinds of chaos in the limit of long delay times: Strong and weak chaos. For strong chaos, the maximal Lyapunov exponent is of the order of the time scales of the nonlinear unit without delay, whereas for weak chaos it is of the order of the inverse delay time. For semiconductor lasers and for some electronic circuits, we show that time-delayed feedback leads to transitions between strong and weak chaos. For networks, the stability of chaos synchronization is related to the eigenvalue gap of the coupling matrix and the maximal Lyapunov exponent of a single unit. As a consequence, only networks with weak chaos can synchronize.

Reference:

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