Effects of Scale-Free Topological Properties on Dynamical Synchronization and Control in Coupled Map Lattices

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Abstract: In the paper, we study effects of scale-free (SF) topology on dynamical synchronization and control in coupled map lattices (CML). Our strategy is to apply three feedback control methods, including constant feedback and two types of time-delayed feedback, to a small fraction of network nodes to reach desired synchronous state. Two controlled bifurcation diagrams verses feedback strength are obtained respectively. It is found that the value of critical feedback strength γ_c for the first time-delayed feedback control is increased linearly as ε is increased linearly. The CML with SF loses synchronization and intermittency occurs if $\gamma > \gamma_c$. Numerical examples are presented to demonstrate all results.

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