Optimal synchronization on strongly connected directed networks

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In this paper we construct and analyse strongly connected sparse directed networks with an enhanced propensity for synchronization (PFS). Two types of PFS-enhanced networks are considered: (i) an eigenratio minimizing ensemble with non-vanishing complex parts of the spectrum and (ii) a class of networks with real spectrum but slightly larger eigenratios than (i). We relate the superior PFSs to a strongly skewed out-degree distribution, the density of double links and a hierarchical periphery-core organization. Ensembles (i) and (ii) are found to differ in the density of double links and the particular organization of the core and the periphery-core linkage.

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