Influence of the geometric coefficient on the synchronization and formation of Chimera states in asymmetric coupled RF SQUIDs

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Abstract
Asymmetry and heterogeneity have a strong influence on coupled oscillator dynamics. Synchronization and formation of chimera states in three asymmetric RF coupled SQUIDs, in an external magnetic flux are investigated numerically. The effect of the geometric and physical characteristics of the system such as the radius of the SQUID ring, the distance between two rings, the coupling coefficient of the system in the formation of synchrony between SQUID the formation of Chimera and chaotic states of the system have been investigated. Periodic dynamics as well as hyperchaos between two SQUIDs of the trimer is identified and characterized using the complete Lyapunov spectrum and the Kaplan–Yorke dimension of the system and appropriate measures. Poincaré maps of the system are plotted before, near, and after the resonance frequency to study its dynamical behavior. The influence of the frequency of the external driving flux as well as its amplitude on the synchronization of the system as well as the conditions for the formation of Chimera states have been determined.

For full article, refer to the Persian section