

Characterizing Stable Steady State Of Coupled Limit Cycle Oscillators

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In this work we investigate the stabilization of saddle fixed points of coupled limit cycle oscillators where individual oscillator exhibit saddle equilibrium point. Among several collective behaviour of the coupled oscillators, it has two structurally different type of oscillations suppressions states, namely amplitude death (AD) and oscillations death (OD)^{[1],[2]}. The stabilizing of saddle equilibrium point refer to the AD states where oscillations are ceased and all the oscillators converges to the single stable steady states^[3] and these transitions occur via OD using dispersal mean-field coupling. The local dynamics of the oscillators are governed by Duffing-Holmes oscillators. In the case of OD states oscillators populate to different multi-stable steady states which are coupling dependent fixed points termed as stable inhomogeneous steady states (IHSS) and these states are the results of symmetry-breaking bifurcations. We characterize all of the multi-stable steady states together with AD states by basin stability (BS) measurement^[4] and rigorous bifurcations analysis, also derive some analytical results which supports our obtained numerical results.

References :

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