Collective Rotation-flips in a Ring of Non-isochronous Stuart-Landau Oscillators

Poster

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The synchronization of coupled oscillators is critical to understanding how individual systems can spontaneously coordinate their behaviour through interaction. Here, we study the dynamical phenomenon of coupled heterogeneous non-isochronous Stuart-Landau oscillators in a directed ring network of all the three cases: Anti-Rotating, Counter-Rotating and Uniformly rotating which give rise to smooth and explosive synchronization for small and large no of oscillators respectively. We analyze the collective rotation flip for the anti rotating & the counter rotating Stuart-Landau oscillators and there is no rotation flip for the case of uniformly rotating Stuart-Landau oscillators by computing the effective frequencies, effective amplitudes and the order parameters of Stuart-Landau oscillators. We also observe that the heterogeneous oscillators reached the frequency locked synchronization states abruptly through quasi-periodic states.Finally, with the help of standard deviation, we found that the increment of the critical coupling for effective frequency locking changes with the increment in the number of oscillators.

Keywords: Rotation-flips; Explosive Synchronization; Ring network

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