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Ott-Antonsen attractiveness for parameter-dependent oscillatory networks

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The Ott-Antonsen (OA) ansatz [1] has been widely used to describe large networks of coupled phase oscillators. If the coupling is sinusoidal and if the phase dynamics does not depend on the specific oscillator, then the macroscopic behavior of the network can be fully described by a low-dimensional system. Does the OA manifold remain attractive, when introducing an intrinsic dependence between an oscillator's phase and its dynamics by additional, oscillator specific parameters? To answer this we extended the OA ansatz and proved that parameter-dependent oscillatory networks continue to converge to the OA manifold under certain conditions. Our proof confirms recent numerical findings that hint at this convergence. It also provides a thorough mathematical underpinning for networks of theta neurons, where the OA ansatz has just been applied.

References

[1] [Chaos 18, 037113 (2008), Chaos 19, 023117 (2009)]