

# Synchronous solutions and their stability in nonlocally coupled phase oscillators with propagation delays

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We study the existence and stability of synchronous solutions in a continuum field of non-locally coupled identical phase oscillators with distance-dependent propagation delays. We present a comprehensive stability diagram in the parameter space of the system. From the numerical results a heuristic synchronization condition is suggested, and an analytic relation for the marginal stability curve is obtained. We also provide an expression in the form of a scaling relation that closely follows the marginal stability curve over the complete range of the non-locality parameter.

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