

The Effect on Coupling Strength near the Deterministic to Stochastic Transition

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We examine effectively on synchronization among a network of identical coupled periodic oscillators by using various computational simulation techniques viz. Deterministic, Chemical Langevin Equation (CLE), Tau leap and Stochastic Simulation Algorithm (SSA) methods respectively. When the oscillators are coupled together via different coupling mechanisms, direct, diffusive and mean-field mediated by signaling molecular species, we found synchrony behaviors among them at different coupling

strengths. How fast the synchrony occurs is determined by various techniques, for example permutation entropy, phase difference plot and recurrence plot respectively. Investigation on the strength of this parameter among the four methods reveals that synchronization is achieved must faster in deterministic system than that in stochastic system, and in between them there lies CLE and Tau leap. We claim that these results may be due to destructive role of the noise whose strength is large in stochastic system.