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Noise-induced chimera states in a neural network

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We study an effect which combines coherence resonance and chimeras states in a network of nonlocally coupled excitable elements. We demonstrate that chimera behavior can be observed in a network composed of solely excitable units and not only in oscillatory systems and show that the presence of noise is a crucial condition for this case. Moreover, we uncover the constructive role of noise for chimera states and detect a novel type of coherence resonance, which we call *coherence-resonance chimeras* [1]. In these spatio-temporal patterns coherence resonance is associated with spatially coherent and incoherent behavior, rather than purely temporal coherence or regularity measured by the correlation time. Since we consider a paradigmatic model for neural excitability in a noisy environment, we expect wide-range applications of our results to neuronal networks in general. Moreover, the noise-based control mechanism we propose here reveals an alternative direction for chimera control complementary to recent deterministic control schemes.

References

[1] N. Semenova, A. Zakharova, V. S. Anishchenko, and E. Schöll (2016), arXiv:1512.07036v2