Generalized Tripod Gaits: A Topological Perspective on Neuron Networks

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Synchronization patterns in small neural networks, or Central Pattern Generators (CPGs), are critical for biological processes and have drawn significant interest. In insect locomotion, the tripod gait is a predominant pattern observed in nature and models like the one by Ghigliazza and Holmes~\cite{10.1137/040607563}. Its robustness to parameter changes~\cite{10.1016/j.neucom.2020.06.151, 10.1016/j.cnsns.2019.105047} suggests a link to network topology.

We extended this analysis to bipartite CPGs with up to nine neurons~\cite{10.1007/s11071-024-09830-2}, where generalized tripod gaits consistently dominate. Other stable patterns, such as graph 3-colorings and traveling waves, also appear, highlighting the influence of topology on synchronization dynamics.

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