

Abstract Submitted
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Predicting neural network firing pattern from phase resetting curve¹ SORINEL OPRISAN, ANA OPRISAN, College of Charleston — Autonomous neural networks called central pattern generators (CPG) are composed of endogenously bursting neurons and produce rhythmic activities, such as flying, swimming, walking, chewing, etc. Simplified CPGs for quadrupedal locomotion and swimming are modeled by a ring of neural oscillators such that the output of one oscillator constitutes the input for the subsequent neural oscillator. The phase response curve (PRC) theory discards the detailed conductance-based description of the component neurons of a network and reduces them to “black boxes” characterized by a transfer function, which tabulates the transient change in the intrinsic period of a neural oscillator subject to external stimuli. Based on open-loop PRC, we were able to successfully predict the phase-locked period and relative phase between neurons in a half-center network. We derived existence and stability criteria for heterogeneous ring neural networks that are in good agreement with experimental data.

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