Biology and Medicine Through Mathematics
Conference

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Mixed mode oscillations in three-timescale coupled Morris-Lecar neurons

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Abstract

Mixed mode oscillations (MMOs) are complex oscillatory behaviors of multiple-timescale dynamical systems in which there is an alternation of large-amplitude and small-amplitude oscillations. While MMOs in two-timescale systems have been extensively studied, less is known regarding MMOs emerging in three-timescale systems. In this work, we examine the mechanisms of MMOs in a system of coupled Morris-Lecar neurons with three distinct timescales. We show how features and mechanisms of MMOs vary with respect to several key model parameters. Moreover, we give conditions under which two separate mechanisms of MMOs in the two-timescale context, canard and delayed Andronov-Hopf bifurcation, can interact in a three-timescale setting and produce more robust MMOs.