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Title: Periodically driven noisy neuronal models: a spectral approach

Abstract:

Neurons are often driven by (noisy) periodic or periodically modulated inputs. In many such cases neuronal firing can be characterized by a stochastic phase response map (SPRM) that maps phase of the current spike into the phase of the subsequent spike. More generally, SPRMs represent Markov chains on a circle. In our spectral approach to studying such maps, we analyze path-wise dynamic properties of the Markov chain, such as stochastic periodicity (or phaselocking) and stochastic quasiperiodicity, and show how these properties are read off of the geometry of the spectrum of the transition operator. I will also discuss how SPRMs can be computed for some neuronal models, their relationship with phase response curves, and how they are affected by changes in the ionic channels.