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Stability of traveling waves in a geometric extension of the FitzHugh-Nagumo equations

The FitzHugh-Nagumo equations provide a mathematical model for the propagation of electrical signals along neuronal axons. While the stability of traveling wave solutions has been extensively studied in one dimension, considerably less is known in higher-dimensional settings. In this talk, I will present an extension of the FitzHugh-Nagumo equations to cylindrical surfaces with constant and variable radii. The latter geometry provides a more realistic representation of neuronal axon morphology. I will discuss how surface geometry enters the equations, examine conditions for the nonlinear stability of traveling fronts, and illustrate the effects of geometric variations through numerical simulations.