

On the Global Attractivity, Periodicity and Oscillation of a Single Neuron Model

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A nonlinear delay integral equation modeling the response of a neuron under external stimulus and threshold effects is investigated. We study the global attractivity of the equilibrium as well as the existence of a periodic solution of the system. Sufficient conditions for oscillation (nonoscillation) of all solutions are obtained.

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1 INTRODUCTION

Dynamical characteristics of delay and integrodifferential equations of the form

$$\frac{dx(t)}{dt} = -x(t) + a \tanh \left(x(t) - b \int_0^t k(s)x(t-s) ds - d \right) \quad (1.1)$$