



Nonoscillation, oscillation and convergence of a class of neutral equations

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1. Introduction

The main purpose of this article is to investigate the oscillatory, nonoscillatory and asymptotic behaviours of solutions of the neutral delay equation

$$\frac{d}{dt}[x(t) + px(t - \tau)] = -ax(t) + b \tanh x(t - \tau), \quad t \geq 0, \quad (\text{E})$$

where $a, b > 0$, $|p| < 1$ and $\tau \geq 0$. With each solution $x(t)$ of Eq. (E) we assume the initial condition:

$$x(s) = \phi(s), \quad s \in [-\tau, 0] \quad \text{where} \quad \phi \in C([-\tau, 0], R).$$

If $p = 0$, Eq. (E) takes the form

$$\frac{d}{dt}x(t) = -ax(t) + b \tanh x(t - \tau), \quad t \geq 0. \quad (\text{E}_0)$$

Delay differential equations of various types that contain (E₀) as a special case have been proposed by many authors for the study of the dynamical characteristics of neural networks of Hopfield type. For an approach to this direction the reader is referred to [4–8] and the references cited therein.

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