PERGAMON Nonlinear Analysis: Real World Applications 3 (2002) 25–36

Nonlinear Analysis
Real World Applications

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Continuous dependence of the global attractors of a family of periodic Kolmogorov systems[☆]

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Received 9 April 2000; accepted 7 November 2000

1. Introduction

Let us consider the periodic Kolmogorov system,

$$x_i' = x_i f_i(t, x_1, \ldots, x_n), \quad 1 \leqslant i \leqslant n \tag{1.1}$$

where $f = (f_1, \ldots, f_n) : \mathbb{R} \times \mathbb{R}^n_+ \to \mathbb{R}^n$ is a continuous function with the following properties:

(P_1) f is T-periodic in t. That is, $f(t+T, x) = f(t, x)$.
(P_2) The partial derivative $f_x(t, x)$ is defined and continuous on $\mathbb{R} \times \mathbb{R}^n_+$.

We also assume the following hypotheses hold,

(H_1) There exist positive constants $c_1, \ldots, c_n, m$ such that

$$c_i \frac{\partial f_i}{\partial x_i}(t, x) + \sum_{j \in J_i} c_j \left| \frac{\partial f_j}{\partial x_i}(t, x) \right| \leqslant -m, \quad 1 \leqslant i \leqslant n, \tag{1.2}$$

where $J_i = \{j \in \{1, \ldots, n\} : j \neq i\}$.

(H_2) System (1.1) has a positive solution v which is defined and bounded on a terminal interval of $\mathbb{R}$.

☆ This paper was sponsored by the Spanish MEC, DGFPC, SAB1995-0675.

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PII: S1468-1218(01)00011-6