

FOUR PERIODIC SOLUTIONS OF A GENERALIZED DELAYED PREDATOR-PREY SYSTEM ON TIME SCALES

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ABSTRACT. With the help of a continuation theorem based on Gaines and Mawhin's coincidence degree, easily verifiable criteria are established for the existence of four positive periodic solutions of a generalized delayed predator-prey system on time scales.

1. Introduction. It is well known that a very basic and important problem in the study of a population model with a periodic environment is the global existence and stability of a positive periodic solution. Many good results concerning the existence of at least one positive periodic solution have already been obtained and collected in some monographs (see, for example [6, 7, 10, 11, 18] and the references cited therein). However, the existence results of multiple periodic solutions for biological models are very scarce. Recently, Feng and Chen [12] studied the following two-predator and one prey system with nonmonotone functional response system:

$$(1.1) \quad \begin{aligned} x'(t) &= x(t) \left[a(t) - b(t) \int_{-\infty}^t K(t-s)x(s) ds \right. \\ &\quad \left. - \frac{r(t)y^2(t)}{m^2y^2(t) + x^2(t)} - \frac{f(t)z^2(t)}{n^2z^2(t) + x^2(t)} \right], \\ y'(t) &= y(t) \left[\frac{r(t)x(t - \tau_1(t))y(t - \tau_1(t))}{m^2y^2(t - \tau_1(t)) + x^2(t - \tau_1(t))} - d_1(t) \right], \end{aligned}$$

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