



# Dynamics in a periodic competitive model with stage structure <sup>☆</sup>

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## Abstract

In this paper, we consider a time-delayed periodic system which describes the competition among mature populations. By appealing to theories of monotone dynamical systems, periodic semiflows and uniform persistence, we analyze the evolutionary behavior of the system and establish sufficient conditions for competitive coexistence and exclusion.

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## 1. Introduction

Population models with stage structure have received extensive investigations (see [2,4,5,7,10,14,18,20,22,24] and references therein). To describe a single species growth, Aiello and Freedman [1] proposed the following system:

$$\begin{aligned}\dot{x}(t) &= \alpha e^{-\gamma\tau} x(t - \tau) - \beta x^2(t), \\ \dot{y}(t) &= \alpha x(t) - \gamma y(t) - \alpha e^{-\gamma\tau} x(t - \tau),\end{aligned}\tag{1.1}$$

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