

Logistic种群演化模型的渐近加权周期性

王金良, 李慧凤

青岛理工大学理学院应用数学研究所, 青岛 266033

Asymptotic Weighted Periodicity for the Logistic Population-evolution Model

WANG Jinliang, LI Huifeng

Institute of Applied Mathematics, College of Science, Qingdao Technological University, Qingdao 266033

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摘要

在生态动力学研究中, 研究者们往往假设环境因素 $f(t)$ 随着季节变化而发生周期性变化. 但是诸如光照等因素在这一年的变化都将有别于上一年. 因此环境的变化不是严格周期的, 从而 $f(t+T)=w(t)f(t)$, 这里的 $w(t) \neq 1$. 在我们前期工作中称这类函数为加权周期函数. 本文针对Logistic种群演化模型研究了这一情况, 得到了一个有趣的结果: 当内禀增长率和种内竞争率都发生加权周期变化时, 种群演化会呈现出某种渐近加权周期性, 而且其权函数刚好是种内竞争率权函数的倒数. 这很好地解释了一个生态学现象: 种内竞争加剧则意味着种群数量加快下降.

 关键词: [渐近加权周期性](#) [Logistic种群演化模型](#) [反应-扩散方程](#)

Abstract:

In the study of the ecological dynamics, the researchers always assume the factors $f(t)$ of the circumstances vary periodically according to the changes of the seasons. But as the sunlight and other factors of this year may be different from that year, so the variation of $f(t)$ is not rigidly periodic, that is, $f(t+T) = w(t)f(t)$ with $w(t) \neq 1$, which is called weighted periodic function in our previous works. Here this case is tried on the Logistic population-evolution model and it gives a very interesting result: in case the inherent increasing rate and the interspecific competition rate vary in a weighted periodic manner, the evolution of the population will show itself asymptotic weighted periodicity and the weight is just the reciprocal of that for the interspecific competition rate. It gives a good explanation to the ecological phenomenon that more fierce competition implies more rapid decreasing of the population.

 Key words: [asymptotic weighted periodicity](#) [Logistic population-evolution model](#) [reaction-diffusion equation](#)

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