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POSITIVE ATTRACTOR OF DIFFUSIVE LOGISTIC EQUATIONS WITH INFINITE TIME DELAY AND IMPULSES

Jalina Widjaja[1] and Murk J. Bottema[2]

[1]Analysis and Geometry Group
Institut Teknologi Bandung, Bandung, Indonesia 40132

[2]School of Informatics and Engineering
Flinders University, Adelaide, SA 5001

Abstract. A system of diffusive logistic equations with fixed impulse times and continuous time delay is investigated. This system represents the dynamics of a multi species population. Some conditions under which the positive steady-state of the system without impulses becomes an attractor of the system with impulses are presented.
Keywords. Infinite delay, impulse, logistic equation, diffusion, Liapunov functional.
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1 Introduction

The logistic equation has been investigated by many researchers. In [8] Schiaffino investigated the system of a single species with diffusion and continuous delay. He showed the asymptotic behavior of the solution by using the prior estimate under some conditions. Yamada in [10] extended this result. The proof was based on the energy method with use of a certain Liapunov functional.

Worz-Busekros [9] obtained sufficient conditions for the global asymptotic behavior of the solution of a multi species logistic system with infinite delay by assuming the delay kernels are a convex combination of exponential functions. Gopalsamy [2] discussed a similar problem and showed the asymptotic behavior of the solution using a continuous Liapunov-like (non-negative and non-differentiable) function. In [1] Bereketoglu and Gyori used the method based on finding a positive bounded function that satisfied the system with a certain pertubation.

The stability of the logistic equation with impulses can be found in [3], [4], [5], [6], and [7]. These papers used the notion of stability in terms of two measures and the comparison to a simpler ordinary differential system.

The papers listed in the paragraphs above motivated the current study on a system of logistic equations with these phenomena: diffusion, continuous infinite time delay, and impulses which occur at fixed times. This system is considered in a bounded domain and infinite interval of time. The second