

Asymptotic behaviour of scalar delayed population models

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ABSTRACT

We address the global behaviour of positive solutions of a general delayed logistic equation $\dot{x}(t) = b(t)x(t)[1 - L(x_t)]$, where $b : [0, \infty) \rightarrow (0, \infty)$ is continuous and $L : C([-r, 0]; \mathbb{R}) \rightarrow \mathbb{R}$ is a bounded linear operator. It is assumed that L has an undelayed term that dominates the delayed part. Sufficient conditions for the global asymptotic stability of the positive equilibrium are given, generalizing results in [1]. We also relate these conditions to the exponential asymptotic stability *globally in the delays* of scalar linear FDEs $\dot{x}(t) = -L(x_t)$. The techniques in [1] are also extended to the study of the global asymptotic stability of the zero solution for general scalar FDEs $\dot{x}(t) = f(t, x_t)$. As an illustration, we show how this setting immediately provides known stability results for some delayed population models (see e.g. [2]).

Key Words: delayed population model, global asymptotic stability.

AMS Classification: 34K20, 34K25, 34K06

References

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