

A Nonautonomous Chemostat System with Delays

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Abstract

We consider a nonautonomous delayed chemostat system modelling n species in competition. Conditions for the extinction versus persistence of all the species are established. When the coefficients and delays are periodic in time, criteria for the existence of (at least) n nontrivial and nonnegative periodic solutions are given. Further results guarantee that the system admits at least one strictly positive periodic solution. For the model with a simple microorganism, a refinement of the previous analysis provides the uniform persistence, as well as the global attractivity of a positive periodic solution.

These results generalise and enhance recent achievements in the literature, see [1, 2].

References

- [1] T. Faria, Periodic solutions for a delayed competitive chemostat model with periodic nutrient input and rate, *Nonlinearity* 38 (2025), paper 055023, pp. 1-22.
- [2] T. Faria, J.G. Mesquita, A competitive chemostat model with time-dependent delays, *Nonlinear Anal. RWA* 88 (2026), paper 104476, pp. 1-16.