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A periodic competitive chemostat model with delays

We consider a delayed chemostat system with nonautonomous coefficients and consumption functions modelling n species in competition. Conditions for the extinction of all the species are established. When the nutrient input and washout rate are periodic, criteria for the existence of 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 generalize and enhance recent achievements in the literature, see [1,2].

[1] T. Faria, Periodic solutions for a delayed competitive chemostat model with periodic nutrient input and rate, Nonlinearity (2025) (to appear).

[2] T. Faria, J.G. Mesquita, A competitive chemostat model with time-dependent delays (submitted).