Numerical Modeling of Dynamics of Generalized Population Systems with Time Delay

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The mathematical models of are often expressed in terms of differential equations, which describe how populations change with time. We investigate a nonlinear dynamics of a system of populations in presence of time delay. The delay leads to an enrichment of the nonlinear dynamics of the system which is demonstrated by a discussion of new orbits in the phase space of the system, dependent on the time-delay parameters, as well as by an investigation of the influence of the delay. In more detail we introduce a time delay and generalize a system of population dynamics model PDEs [1, 2] and then numerically solve the system with and without time delay. We use a modification of the method of Adams for the numerical solution of the system of model equations with time delay. By appropriate selection of the parameters and initial conditions we show the impact of the delay time on the dynamics of the studied population system.

References

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