The age-structured population model with infinite life span: a numerical approach.

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Population dynamics modelization entails making different choices. We decided to choose an age-structured population model, which means: individuals are non-homogeneous, they are distinguished by the age and the model is continuous and deterministic. The choice of the age as a physiological parameter to structure a population and describe its dynamics involves the election of the life-span. Models both with finite and unbounded maximum age appear in the literature [2].

The numerical integration of models with unbounded life-span (for instance, in demography) has been integrated with different techniques. It was usually to use a maximum artificial age A, an initial condition with compact support on $[0, A]$ and a finite integration time T, which allowed to integrate in a finite age interval $[0, A + T]$. However, when the dynamics of the problem is studied (long-time integration), this is unfeasible unless we know properties of the solution [1]. Thus, we look for new numerical techniques to integrate in $[0, \infty)$. This is the aim of the present work.

We propose and analyse a new second order numerical method in this setting. We report numerical experiments to show the convergence properties and the behaviour of the problem to simulate the evolution of Nicholson's blowfies model [3].

References

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