NEW PROSPECTS FOR NUMERICAL BIFURCATION OF NON LINEAR DELAY EQUATIONS

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Functional and functional differential equations of retarded type arise to model a variety of problems in biology, natural science, and medicine, where there is a time lag or after-effect. Such evolution equations describe an infinite-dimensional dynamical systems, which can be recast as abstract differential equations on the state-space. Due to the high complexity, the analysis of their dynamical properties needs suitable numerical methods. Today, no software is available to study numerically the bifurcation properties of general delay systems. In the last decade, the pseudospectral discretization technique has been proposed to derive from the abstract equation a systems of ordinary differential equations (ODEs), in order to study numerically the stability of equilibria of the linearized system [1] and, more recently, the dynamical and bifurcation properties of equilibria and periodic solutions of non linear system with existing well-developed software for nonlinear ODE [3]. We present an overview of the approach, showing its effectiveness and flexibility by way of some numerical examples.

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References

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