The IG approach for nonlinear delay differential equations: back to ordinary differential equations

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Nowadays delay differential equations (DDEs) are proposed to describe a variety of problems in science and engineering. In fact, the introduction of the dependence on the past history in the models allows a better description of the real-life phenomena and a more reliable prediction of their behavior. Delay models present a more complex dynamics since, opposite to ordinary differential equations (ODEs), they are infinite dimensional dynamical systems. Therefore their study needs to be complemented with efficient numerical methods. From a dynamical system point of view, a first relevant task concerns the stability of equilibria. Recently a numerical approach has been developed to this aim, which is based on the discretization of the infinitesimal generator (IG) associated to the linearized system [1, 2]. In this talk we present an overview of the so called lG-approach and we propose it to reduce the original system of DDEs to a system of ODEs in general nonlinear. This allows the use of proven and efficient tools for the analysis of bifurcation of ODE, without resorting to the development of ad-hoc techniques for the original model. Some test examples are given.

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References

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