DOUGLAS DUARTE NOVAES

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ABSTRACT

The Averaging Method is a classical and matured tool that provides a useful means to study the behavior of nonlinear smooth dynamical systems. One of the main applications of this method consists to transform the problem of finding periodic solutions of a dynamical systems in a problem of finding solutions of an algebraic equation.

The classical results for studying the periodic solutions of differential systems need at least that those systems be of class C^2. Recently, the Averaging Theory has been extended for studying periodic orbits to continuous differential systems using mainly the Brouwer degree.

On the other hand, the mathematical field which study the discontinuous dynamical systems, called Filippov Systems, is a subject that has been developing at a very fast pace in recent years. This field has become certainly one of the common frontiers between Mathematics, Physics, Engineering, and other related sciences. In spite of the fast developing of this subject, there are just a few tools to work with Filippov Systems as well as numerous open problems.

Our main objective, in this work, is to extend the averaging method for studying the periodic solutions of a class of Filippov Systems. Thus, overall results are presented

to ensure the existence of limit cycles of such systems.

In this class, of Filippov Systems, are contained the models of many mechanical phenomenon. Among these, we study in details the synchronization phenomena of harmonic oscillators weakly coupled. We also point out some similar problems to be studied in the future, involving usual complications of Filippov Systems.

CONTEÚDO