

Title:

Melnikov analysis for a class of nonsmooth differential systems

Abstract:

We develop the Melnikov functions for a class of nonsmooth differential systems, which generalizes, up to order 2, some previous results in the literature. Whereas the first order Melnikov function for the nonsmooth case remains the same as for the smooth one (i.e. the first order averaged function) the second order Melnikov function for the nonsmooth case is different from the smooth one (i.e. the second order averaged function). We show that, in this case, a new term depending on the jump of discontinuity and on the geometry of the switching manifold is added to the second order averaged function. We apply this result showing that 7 is a lower bound for the Hilbert number of the family of piecewise linear differential systems in the plane with two pieces separated by a cubic curve.