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Limit Cycles of Piecewise Smooth Differential Equations on Two Dimensional Torus

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Abstract In this paper we study the limit cycles of some classes of piecewise smooth vector fields defined in the two dimensional torus. The piecewise smooth vector fields that we consider are composed by linear, Ricatti with constant coefficients and perturbations of these one, which are given in (3). Considering these piecewise smooth vector fields we characterize the global dynamics, studying the upper bound of number of limit cycles, the existence of non-trivial recurrence and a continuum of periodic orbits. We also present a family of piecewise smooth vector fields that posses a finite number of fold points and, for this family we prove that for any $2k$ number of limit cycles there exists a piecewise smooth vector fields in this family that presents k number of limit cycles and prove that some classes of piecewise smooth vector fields presents a non-trivial recurrence or a continuum of periodic orbits.

Keywords Piecewise smooth differential equations · Limit cycles · Global dynamics in torus

Mathematics Subject Classification Primary 34A36 · 34C07 · 34C23 · 34C60

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