Contents lists available at ScienceDirect

Bulletin des Sciences Mathématiques

Limit cycles of piecewise differential equations on the cylinder

Ali Bakhshalizadeh [a], Jaume Llibre [b],*

[a] *Department of Mathematical Sciences, Isfahan University of Technology, Isfahan, 84156-83111, Iran*
[b] *Departament de Matematiques, Universitat Autònoma de Barcelona, 08193 Bellaterra, Barcelona, Catalonia, Spain*

A B S T R A C T

We consider the discontinuous piecewise differential equations of the form

$$\begin{pmatrix} \dfrac{dx_1}{dt} \\ \dfrac{dx_2}{dt} \end{pmatrix} = \begin{cases} a_0(t) + a_1(t)x_1 + \ldots + a_n(t)x_1^n, & \text{if } 0 \leqslant t \leqslant \pi, \\ b_0(t) + b_1(t)x_2 + \ldots + b_m(t)x_2^m, & \text{if } \pi \leqslant t \leqslant 2\pi, \end{cases}$$

where $a_0(t), a_1(t), \ldots, a_n(t)$ and $b_0(t), b_1(t), \ldots, b_m(t)$ are 2π-periodic functions in the variable t, and we study the number of limit cycles of such equations on the cylinder. In this way we give exact bounds for the maximum number of limit cycles that the piecewise differential equations have in function of n and m.

Note that usually the discontinuous piecewise differential systems are discontinuous in the dependent variable, here the system is discontinuous in the independent variable.

© 2021 Elsevier Masson SAS. All rights reserved.

---

* Corresponding author.
E-mail addresses: a.bakhsh@math.iut.ac.ir (A. Bakhshalizadeh), jllibre@mat.uab.cat (J. Llibre).