

论文

一类微分方程零解全局弱吸引和全局吸引到充要条件

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摘要:

考虑二阶微分方程

$$x = \varphi(y) - F(x), y = -g(x)q(y)$$

零解的全局弱吸引和全局吸引性, 说明了Filippov条件(A<sub>2</sub>)不能排除最大椭圆扇形S\*的存在性, 也不能排除∂S\*作为其外侧邻域轨线正向极限集的可能. 全面回答了文献[8]未提出的问题; 得到了方程(E)满足或不满足Filippov条件时零解全局弱吸引和全局吸引的一系列充分必要条件, 同时也得到了零解全局渐近稳定的一些新条件.

关键词: Filippov条件 全局吸引 全局弱吸引 全局渐近稳定

分类号:

34D05; 34C05

Necessary and Sufficient Conditions for the Global Weak Attractivity and Global Attractivity of a Class of Nonlinear Differential Equations

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Abstract:

This paper deals with the global weak attractivity and global attractivity for the nonlinear differential equations

$$x = \varphi(y) - F(x), \{y\} = -g(x)q(y).$$

It is shown that Filippov condition (A<sub>2</sub>) cannot exclude the existence of the maximum elliptic sector S\* and it cannot exclude the possibility of ∂S\* as the ω-limit set of the orbits departing from the exterior of S\*. The problem proposed by Jiang Jifa in Nonlinear Analysis, 28(5), 855--870(1997) is answered by a negative answer. A series of necessary and sufficient conditions for the global weak attractivity and global attractivity are established for both the cases that Filippov condition holds and Filippov condition fails. Some new conditions for the global asymptotic stability are also obtained.

Keywords: Filippov condition Global attractivity Global weak attractivity Global asymptotic stability

收稿日期 2007-03-07 修回日期 2008-10-11 网络版发布日期 2009-06-25

DOI:

基金项目:

国家自然科学基金(10671020)资助

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