TIONS

PERIODIC SOLUTIONS OF DELAY DIFFERENTIAL EQUATIONS WITH TWO DELAY VIA BI-HAMILTONIAN SYSTEMS [*][†]

Anna Cima[1], Li Jibin (李继彬)[2] & Jaume Llibre[1]

([1] *Department of de Matematiques, Universitat Autonoma de Barcelona, 08193, Barcelona, Spain*

[2] *School of Science, Kunming University of Science and Technology, Kunming 650093*)

Abstract

Using the theory of existence of periodic solutions of a bi-Hamiltonian system and the method of symmetry groups, the existence of periodic solutions for some two-delay differential equation is obtained. Some new sufficient conditions are given

Keywords periodic solution, delay equation, bi-Hamiltonian system, symmetry group action

1991 MR Subject Classification 34K13, 34K18, 34C23, 37J35

1 Introduction and Statement of the Main Result

In this paper, we shall study the existence of periodic solutions for the two following differential delay equations

$$x'(t) = -f(x(t - r_1))g(x(t - r_2)) - f(x(t - r_2))g(x(t - r_1)), \qquad (1)$$

and

$$x'(t) = f(x(t - r_1))g(x(t - r_2)) + f(x(t - r_2))g(x(t - r_1)), \qquad (2)$$

where r_i ($i = 1, 2$) are positive constants. When the function $g(x) \equiv 1$, equations (1) and (2) become respectively

$$x'(t) = -f(x(t - r_1)) - f(x(t - r_2)), \qquad (3)$$

and

$$x'(t) = f(x(t - r_1)) + f(x(t - r_2)). \qquad (4)$$