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FORCED OSCILLATION FOR A CLASS OF IMPULSIVE HYPERBOLIC DIFFERENTIAL EQUATIONS

Lihu Deng[1,2] Chunlai Mu[1]

[1]Mathematics college
Sichuan University, Chengdu, 610064 P.R. China
[2]Institute of Applied Mathematics
Dongguan University of Technology, Dongguan, 523106, P.R. China

Abstract. In this paper, we use a new method to investigate forced oscillation of solutions for a class of impulsive hyperbolic differential equations satisfying Robin boundary condition.(i.e.,using Robin eigenvalue problem to study the Robin boundary value problem). Some sufficient conditions are obtained.
Keywords. Hyperbolic differential equation; impulsive; forced oscillation; Robin boundary condition; Robin eigenvalue problem
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1 Introduction

Recently, many people have studied impulsive partial differential equations. L.H. Erbe, H.I. Freedman, X Z Liu , and J H Wu [1] have given comparison principles for impulsive parabolic equations; D. Bainov , Z. Kamont , and E. Minchev [2] have studied periodic boundary value problem for impulsive hyperbolic partial differential equations of first order; L Q Zhang[3] has given oscillation criteria for hyperbolic partial differential equations with fixed moments of impulse effects; L H Deng and W G Ge [4] have given oscillation criteria for a class of impulsive parabolic equations. In this paper, we use a new method to investigate forced oscillation of the following impulse hyperbolic differential equation satisfying Robin boundary condition(i.e.,using Robin eigenvalue problem(see formula (3)) to study the Robin boundary value problem (1)-(2)).

$$\left\{ \begin{array}{ll} u_{tt} = a(t)\triangle u - g(t,x)f(u) + h(t,x) & t \neq t_k \\ u(t_k^+,x) - u(t_k^-,x) = b_k u(t_k,x) & k = 1,2,\cdots \ \} \\ u_t(t_k^+,x) - u_t(t_k^-,x) = c_k u_t(t_k,x) & k = 1,2,\cdots \end{array} \right. \tag{1}$$

$$\frac{\partial u}{\partial n} + \beta(x)u(t,x) = 0, \quad x \in \partial\Omega, \tag{2}$$

where $\triangle$ is the Laplacian, $u = u(t,x)$, $(t,x) \in R_+ \times \partial\Omega = G$, $\Omega \subseteq R^n$ is a bound domain with piecewise smooth boundary $\partial\Omega$, $R_+ = [0,+\infty)$, n is the