Dynamics of Continuous, Discrete and Impulsive Systems
Series **A:** *Mathematical Analysis* **14 (2007)** 415-434
 http://www.watam.org

EXISTENCE OF SOLUTIONS FOR SINGULAR IMPULSIVE BOUNDARY VALUE PROBLEMS ON THE HALF-LINE [1]

Chuanxia Hou[a,b] and Baoqiang Yan[a] [2]
[a]Department of Mathematics
Shandong Normal University, Jinan 250014, P.R.China
[b]Department of Mathematics
Jinan University, Jinan 250014, P.R.China

Abstract. This paper discusses the existence of solutions for singular impulsive boundary value problems on the half-line. By the method of upper and lower solutions, some necessary and sufficient conditions for the existence of solutions are obtained.
Keywords. Boundary value problems, singularity, impulses, lower and upper solutions, existence.
AMS(MOS)subject classification: 34B15, 34A37.

1 Introduction

In this paper, we consider the impulsive differential problems

$$\begin{cases} x'' = f(t,x,x'), & t>0, t\neq t_1, \\ \Delta x|_{t=t_1} = I(x(t_1)), \\ \Delta x'|_{t=t_1} = 0 \end{cases} \tag{1.1}$$

with the boundary value conditions

$$x(0)=r, \quad x(\infty)=\text{const}, \tag{1.2}$$

$$x(0)=r, \qquad x'(\infty)=l, \tag{1.3}$$

where $\Delta x|_{t=t_1} = x(t_1+0)-x(t_1-0) = x(t_1+)-x(t_1)$, $\Delta x'|_{t=t_1} = x'(t_1+0)-x'(t_1-0)$, $f\in C(J\times\Omega\times R,R), r\in\Omega, J,\Omega$ are nonempty open intervals in R, and f may be singular at $t=0$ or $x=0$, $I(x)\in C(R,R)$, and I is nondecreasing in x. In (1.2), the limit $x(\infty)$ is a constant not previously given, but in (1.3) l is a given constant.

This paper we always assume the following hypotheses:

[1]The project is supported by the fund of National Natural Science(10571111) and the fund of Natural Science of Shandong Province(Y2005A07)
[2]The corresponding author, E-mail:bqyan819@beelink.com