EXISTENCE OF SOLUTIONS OF SINGULAR NONLINEAR SECOND-ORDER BOUNDARY VALUE PROBLEMS

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Abstract.

This study investigates the existence of solutions of singular nonlinear second-order boundary value problems. The existence of solutions is further developed based on the notion given by O'Regan (World Scientific Press, Singapore, 1994). It is proved that there is a solution for the singular non-linear second-order boundary value problems.

Keywords: Existence of solution, Singular nonlinear boundary value problems

1 Introduction

This paper deals with the existence of solutions of boundary value problems of the following types:

$$\frac{1}{p(t)}(p(t)y'(t))' + f(t, y(t), p(t)y'(t)) = 0 \qquad 0 < t < 1 \qquad (*)$$

$$y(1) = \lim_{t \to 0^+} p(t)y'(t) = 0$$

where $\lim_{y \to 0^+} f(t, y(t), p(t)y'(t)) = \infty$, $p \in C[0,1] \cap C^1(0,1]$ with $p > 0$ on $(0,1]$, $p(0) = 0$ and $\int_0^1 \frac{dt}{p(t)} = \infty$.