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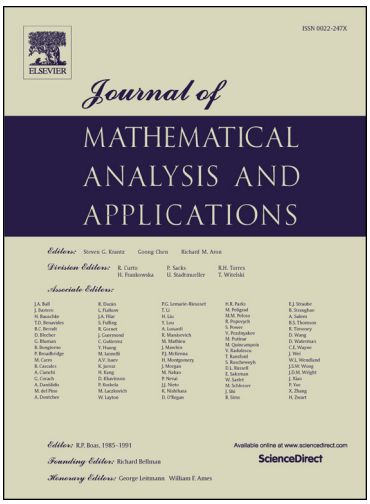

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Positive solutions of Dirichlet and homoclinic type for a class of singular equations

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Abstract

We study a nonlinear singular boundary value problem and prove that, depending on a relationship between exponents of power terms, the problem has either solutions of Dirichlet type or homoclinic solutions. We make use of shooting techniques and lower and upper solutions.

MSC 2010 Classification: 34B16, 34B18

Key words : singularity, positive solution, Dirichlet problem, homoclinic solution

1 Introduction and main results

In recent decades many authors have studied the solvability of singular differential equations under different boundary conditions. A wealth of general results for singular ordinary differential equations can be found in monographs such as [1] or [14]. It is worth mentioning also that in [18] the reader may get acquainted with a rich collection of singular problems, arising in the applied sciences, whose solutions illustrate a wide variety of mathematical techniques.

In the present note, we deal with a one dimensional singular problem of p-Laplacian type which, specifically, can be put in the form

$$(|u'|^{p-2}u')' = \frac{|u'|^k}{u^s} - f(t,u,u'), \tag{1}$$