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On the singular generalized Fisher-like equation with derivative depending nonlinearity.

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The existence and multiplicity of positive solutions for the second-order nonlinear boundary value problem

$$-y'' + cy' + \lambda y = m(x)f(x, y(x), y'(x)), \quad x \in (0, +\infty),$$

$$y(0) = y_0, \quad y(+\infty) = 0$$

is investigated, where c, λ are positive parameters, m and f are continuous functions. The term m may exhibit a singularity at the origin, while f is assumed to have a polynomial growth. Some examples and numerical computations are also presented. In order to obtain a priori estimates of the solutions, which can be non-monotone, recent fixed-point theorems on cones of Banach spaces are used.

Reviewer: [Cristina Marcelli \(Ancona\)](#)

MSC:

- [34B40](#) Boundary value problems on infinite intervals for ordinary differential equations
- [34B16](#) Singular nonlinear boundary value problems for ordinary differential equations
- [47N20](#) Applications of operator theory to differential and integral equations

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Keywords:

[boundary value problems on halflines](#); [singular boundary value problems](#); [multiplicity of solutions](#); [positive solutions](#); [travelling wave solutions](#)

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References:

- [1] Agarwal, R.A.; Meehan, M.; O'Regan, D., Fixed point theory and applications, Cambridge tracts in mathematics, vol. 141, (2001), Cambridge University Press
- [2] Agarwal, R.A.; O'Regan, D., Infinite interval problems for differential, difference and integral equations, (2001), Kluwer Dordrecht
- [3] Avery, R.; Anderson, D.R., Fixed point theorem of cone expansion and compression of functional type, J. differ. equat. appl., 8, 11, 1073-1083, (2002) · [Zbl 1013.47019](#)
- [4] Avery, R.I.; Anderson, D.R.; Krueger, R.J., An extension of the fixed point theorem of cone expansion and compression of functional type, Commun. appl. nonlinear anal., 13, 1, 15-26, (2006) · [Zbl 1109.47046](#)
- [5] Bielecki, A., Une remarque sur la méthode de Banach-cacciopoli-Tikhonov dans la théorie des équations différentielles ordinaires, Bull. acad. polon. sci., 4, 261-264, (1956) · [Zbl 0070.08103](#)
- [6] Deimling, K., Nonlinear functional analysis, (1985), Springer-Verlag Berlin, Heidelberg · [Zbl 0559.47040](#)
- [7] S. Djebali, O. Kavian, T. Moussaoui, Qualitative properties and existence of solutions for a generalized Fisher-like equation, Int. J. Pure Appl. Math. Sci., in press. · [Zbl 1301.34020](#)
- [8] Djebali, S.; Mebarki, K., Existence results for a class of BVPs on the positive half-line, Commun. appl. nonlinear anal., 14, 2, 13-31, (2007) · [Zbl 1129.34017](#)
- [9] Djebali, S.; Mebarki, K., Multiple positive solutions for singular BVPs on the positive half-line, Comput. math. appl., 55, 2940-2952, (2008) · [Zbl 1142.34316](#)
- [10] Djebali, S.; Moussaoui, T., A class of second order BVPs on infinite intervals, Electr. J. qual. theo. differ. equat., 4, 1-19, (2006) · [Zbl 1134.34018](#)
- [11] Hao, Z.C.; Liang, J.; Xiao, T.J., Positive solutions of operator equations on half-line, J. math. anal. appl., 314, 423-435, (2006)

· [Zbl 1086.47035](#)

- [12] Guo, D.; Lakshmikantham, V., Nonlinear problems in abstract cones, (1988), Academic Press San Diego · [Zbl 0661.47045](#)
- [13] Krasnozels'kiĭ, M.A., Positive solutions of operator equations, (1964), Noordhoff Groningen, The Netherlands
- [14] Krasnozels'kiĭ, M.A., Topological methods in the theory of nonlinear integral equations, (1964), Pergamon Elmsford, New York
- [15] Leggett, R.W.; Williams, L.R., Multiple positive fixed points of nonlinear operators on ordered Banach spaces, Indiana univ. math. J., 28, 673-688, (1979) · [Zbl 0421.47033](#)
- [16] Murray, J.D., Mathematical biology, Biomathematics texts, vol. 19, (1989), Springer-Verlag · [Zbl 0682.92001](#)
- [17] Przeradzki, B., Travelling waves for reaction – diffusion equations with time depending nonlinearities, J. math. anal. appl., 281, 164-170, (2003) · [Zbl 1032.35089](#)
- [18] Zeidler, E., Nonlinear functional analysis and its applications, vol. I: fixed point theorems, (1986), Springer-Verlag New York
- [19] Zima, M., On a certain boundary value problem, Ann. soc. math. polon. ser. I: comment. math., XXIX, 331-340, (1990) · [Zbl 0724.34029](#)
- [20] Zima, M., On positive solutions of boundary value problems on the half-line, J. math. anal. appl., 259, 127-136, (2001) · [Zbl 1003.34024](#)

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