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On a fractional-order p -Laplacian boundary value problem at resonance on the half-line with two dimensional kernel

- [O. F. Imaga](#) &
- [S. A. lyase](#)

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Abstract

In this work, we consider the solvability of a fractional-order p -Laplacian boundary value problem on the half-line where the fractional differential operator is nonlinear and has a kernel dimension equal to two. Due to the nonlinearity of the fractional differential operator, the Ge and Ren extension of Mawhin's coincidence degree theory is applied to obtain existence results for the boundary value problem at resonance. Two examples are used to validate the established results.

Introduction

In this paper, we obtain existence results for the following fractional-order p -Laplacian boundary value problem at resonance on the half-line with integral boundary conditions:

Conclusion

Fractional differential equations are an efficient tool for describing the memory of different substances and have become popular recently. In order

to further enrich this subject area, this work considers existence results for fractional-order p -Laplacian boundary value problem on the half-line at resonance where the differential operator is nonlinear and has a kernel dimension equal to two. The proof of the main result is based on the Ge and Ren coincidence degree theory, and the results obtained are new and extend some current results to the two-dimensional kernel. Examples were given to demonstrate the practicability and validity of our main results.

Availability of data and materials

Not applicable.

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Author information

Authors and Affiliations

- 1. Department of Mathematics, Covenant University, Ota, Ogun State, Nigeria**

O. F. Imaga & S. A. Iyase

Contributions

OF conceived the idea. SA supervised the work. All authors discussed and contributed to the final manuscript. All authors read and approved the final manuscript.

Corresponding author

Correspondence to [O. F. Imaga](#).

Ethics declarations

Competing interests

The authors declare that they have no competing interests.

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