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Application of Schauder fixed point theorem to a coupled system of differential equations of fractional order. (English) Zbl 1477.34012

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Summary: In this paper, by using Schauder fixed point theorem, we study the existence of at least one positive solution to a coupled system of fractional boundary value problems given by

$$\begin{cases} -D_{0+}^{\nu_1} y_1(t) = \lambda_1 a_1(t) f(t, y_1(t), y_2(t)) + e_1(t), \\ -D_{0+}^{\nu_2} y_2(t) = \lambda_2 a_2(t) f(t, y_1(t), y_2(t)) + e_2(t), \end{cases}$$

where $\nu_1, \nu_2 \in (n-1, n]$ for $n > 3$ and $n \in \mathbb{N}$, subject to the boundary conditions $y_1^{(i)}(0) = 0 = y_2^{(i)}(0)$, for $0 \leq i \leq n-2$, and $[D_{0+}^\alpha y_1(t)]_{t=1} = 0 = [D_{0+}^\alpha y_2(t)]_{t=1}$, for $1 \leq \alpha \leq n-2$.

MSC:

34A08 Fractional ordinary differential equations

34B18 Positive solutions to nonlinear boundary value problems for ordinary differential equations

47H10 Fixed-point theorems

Cited in 4 Documents

Keywords:

fractional differential equation; Schauder fixed point theorem; positive solution

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