MULTIPLE POSITIVE SOLUTIONS FOR NONLINEAR FRACTIONAL DIFFERENTIAL SYSTEMS

NEMAT NYAMORADI AND TAHEREH BASHIRI

Abstract. In this paper, we study the existence of positive solutions to boundary value problem for fractional differential system

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\begin{align*}
D_0^\alpha u(t) + f_1(t, u(t), v(t)) &= 0, \quad t \in (0, 1), \\
D_0^\beta v(t) + f_2(t, u(t), v(t)) &= 0, \quad t \in (0, 1), \quad 1 < \alpha \leq 2, \\
u(0) &= 0, \quad D_0^\mu u(1) - \mu_1 D_0^\mu u(\eta_1) = \lambda_1, \\
v(0) &= 0, \quad D_0^\nu v(1) - \nu_2 D_0^\nu v(\eta_2) = \lambda_2, \quad 0 < \beta < 1,
\end{align*}
\]

where \(D_0^\alpha\) is the Riemann-Liouville fractional derivative of order \(\alpha\). By using the Leggett-Williams fixed point theorem in a cone, the existence of three positive solutions for nonlinear singular boundary value problems is obtained.


Keywords and phrases: Cone, multi point boundary value problem, fixed point theorem, Riemann-Liouville fractional derivative.

REFERENCES