POSITIVE SOLUTIONS FOR BOUNDARY VALUE PROBLEMS OF $N$–DIMENSION NONLINEAR FRACTIONAL DIFFERENTIAL SYSTEM WITH INTEGRAL BOUNDARY CONDITIONS

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Abstract. In this paper, we study existence of positive solutions to the system of three-point fractional boundary value problem

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\begin{align*}
D_{0+}^{\alpha_i} u_i(t) + \lambda_i a_i(t) f_i(u_1(t), \ldots, u_n(t)) &= 0, \quad 0 < t < 1, \quad 2 < \alpha_i \leq 3 \\
u_i(0) &= u_i'(0) = 0 \\
u_i'(1) - \mu_i u_i' (\eta_i) &= \int_0^1 \phi_i(s) u_i'(s) ds
\end{align*}
\]

where for $i = 1, \ldots, n$, $\lambda_i$ is a positive parameter, $D_{0+}^{\alpha_i}$ is the standard Riemann-Liouville differential operator of order $\alpha_i \in (2, 3]$, $\eta_i \in (0, 1)$, $\mu_i \geq 0$, $f_i : [0, +\infty)^n \to [0, +\infty)$ is a continuous function and $\phi_i : (0, 1) \to (0, +\infty)$ is a continuous increasing function and $\int_0^1 s^{\alpha_i-2} \phi_i(s) ds < +\infty$. Existence results are obtained by means of Krasnosel’skii’s fixed point theorem and the vector version of Krasnosel’skii’s fixed point theorem.


Keywords and phrases: Fractional derivatives, three-point BVPs, integral boundary conditions, positive solutions, fixed point theorem.

REFERENCES


