EXISTENCE RESULT OF POSITIVE SOLUTION FOR BOUNDARY VALUE PROBLEMS OF FRACTIONAL ORDER WITH INTEGRO–DIFFERENTIAL BOUNDARY CONDITIONS

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Abstract. In this paper we study the following fractional boundary value problem with integro-differential boundary conditions

\[
\begin{aligned}
D^{\alpha}_0 u(t) - f(t,u(t),D^{\alpha-1}_0 u(t),D^{1-\alpha}_0 u(t)) &= 0, \quad t \in [0,T], \quad n - 1 \leq \alpha < n, \\
u^{(j)}(0) &= 0, \quad D^{\alpha-1}_0 u(T) + \int_0^T u(\omega)d\omega + \sum_{i=1}^{m-2} \beta_i u(\xi_i) = 0, \quad j = 0, \ldots, n - 2, \\
0 < \xi_i < \xi_{i+1} < T, \quad \beta_i \in [0,\infty), \quad i = 1,2,\ldots,m-2, \quad n \in \mathbb{N} \setminus \{1\}, \\
T > 0,
\end{aligned}
\]

where $D^{\alpha}_0, D^{\alpha-1}_0$ represent the standard Riemann-Liouville fractional derivative of order $\alpha$. The main result includes some interesting fixed point and functional analysis techniques to obtain claimed existence result.

Mathematics subject classification (2010): fractional derivative, generalized boundary conditions, positive solutions, fixed point theory.

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REFERENCES


