# Solutions of sum-type singular fractional q-integro-differential equation with $m$-point boundary value using quantum calculus

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## Abstract

In this study, we investigate the sum-type singular nonlinear fractional q-integro-differential $m$-point boundary value problem. The existence of positive solutions is obtained by the properties of the Green function, standard Caputo $q$-derivative, Riemann-Liouville fractional $q$-integral and the means of a fixed point theorem on a real Banach space $(\mathcal{X}, \|.\|)$ which has a partially order by using a cone $P \subset \mathcal{X}$. The proofs are based on solving the operator equation $\mathcal{O}_1 x + \mathcal{O}_2 x = x $ such that the operator $\mathcal{O}_1$, $\mathcal{O}_2$ are $r$-convex, sub-homogeneous, respectively and define on cone $P$. As applications, we provide an example illustrating the primary effects.

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