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Erratum

Erratum to "Positive Solution to a Fractional Boundary Value Problem"

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In the paper entitled "Positive solution to a fractional boundray value problems," the following problem (P1) is studied:

$$^{c}D_{0^+}^{q}u(t) = f\left(t, u(t), {}^{c}D_{0^+}^{\sigma}u(t)\right), \quad 0 < t < 1, \tag{1.1}$$

$$u(0) = u''(0) = 0, \qquad u'(1) = \alpha u''(1), \tag{1.2}$$

where $f : [0,1] \times \mathbb{R} \times \mathbb{R} \to \mathbb{R}$ is a given function, $2 < q < 3$, and $1 < \sigma < 2$. Remarking that all the calculuses in this paper are done for $0 < \sigma < 1$ and that if we take $1 < \sigma < 2$, then ${}^{c}D_{0^+}^{\sigma}Tu = (1/\Gamma(2-\sigma))\int_0^t ((Tu)''(s)/(t-s)^{\sigma-1})ds$ and the second derivative with respect to t of $G(t,s)$ is discontinuous for $s = t$, consequently we cannot apply this method to establish the existence and positivity of solution. For this reason, we correct the study of problem (P1) by taking $0 < \sigma < 1$, and then the following corrections are needed.

(1) In page 3, in Lemma 2.3, we should correct ${}^{c}D_{0^+}^{\alpha}t^{\beta-1} = (\Gamma(\beta)/\Gamma(\beta-\alpha))t^{\beta-\alpha-1}$, $\beta > n$.

(2) Equation (2.6) must be

$$u(t) = \frac{1}{\Gamma(q-2)}\int_0^1 \frac{1}{(1-s)^{3-q}} G(t,s)\, y(s)\, ds. \tag{2.6}$$

The Green function in (2.7) is

$$G(t,s) = \begin{cases} \dfrac{(1-s)^{3-q}(t-s)^{q-1}}{(q-1)(q-2)} + \alpha t - \dfrac{t(1-s)}{q-2}, & s < t, \\ \alpha t - \dfrac{t(1-s)}{q-2}, & t \le s. \end{cases} \tag{2.7}$$

(3) Equation (2.11) becomes

$$\begin{aligned} u(t) = {} & \frac{1}{\Gamma(q-2)} \times \int_0^t \left[\frac{(t-s)^{q-1}}{(q-1)(q-2)} + \frac{\alpha t}{(1-s)^{3-q}} - \frac{t(1-s)^{q-2}}{q-2}\right] \times y(s)\, ds \\ & + \frac{1}{\Gamma(q-2)}\int_t^1 \left[\frac{\alpha t}{(1-s)^{3-q}} - \frac{t(1-s)^{q-2}}{q-2}\right] y(s)\, ds. \end{aligned} \tag{2.11}$$

Equation (2.12) must be

$$u(t) = \frac{1}{\Gamma(q-2)}\int_0^1 \frac{1}{(1-s)^{3-q}} G(t,s)\, y(s)\, ds. \tag{2.12}$$

(4) Equation (3.1) must be

$$Tu(t) = \frac{1}{\Gamma(q-2)} \times \int_0^1 \frac{1}{(1-s)^{3-q}} G(t,s)\, f\left(s, u(s), {}^{c}D_{0^+}^{\sigma}u(s)\right) ds. \tag{3.1}$$

In Theorem 3.2, the condition (3.5) must be

$$C_g + C_h < \frac{1}{2}, \qquad A_g + A_h < \frac{\Gamma(2-\sigma)}{2}. \tag{3.5}$$