

AIMS Mathematics (/journal/math)
2020, Volume 5 (/math/article/archives), Issue 4 (/math/article/2020/4/archive-
articles): 3714-3730. doi: 10.3934/math.2020240 (https://doi.org/10.3934/
math.2020240)

[Previous Article \(/article/doi/10.3934/math.2020239\)](/article/doi/10.3934/math.2020239)[Next Article \(/article/doi/10.3934/math.2020241\)](/article/doi/10.3934/math.2020241)

Research article

Implicit fractional differential equation with anti-periodic boundary condition involving Caputo-Katugampola type

Saleh S. Redhwan¹, Sadikali L. Shaikh², Mohammed S. Abdo^{1,3}

1. Department of Mathematics, Dr. Babasaheb Ambedkar Marathwada University Aurangabad, (M.S), 431001, India
2. Department of Mathematics, Maulana Azad College of arts, Science and Commerce, RozaBagh, Aurangabad 431004 (M.S.), India
3. Department of Mathematics, Hodeidah University, Al-Hodeidah, Yemen

Received: 30 December 2019 Accepted: 25 March 2020 Published: 20 April 2020

MSC : 34B15, 34B18, 26A33, 34A12

[Abstract](#)[Full Text\(HTML\)](#)[Download PDF \(/aimspress-data/math/2020/4/PDF/.pdf\)](/aimspress-data/math/2020/4/PDF/.pdf)

This paper deals with a nonlinear implicit fractional differential equation with the anti-periodic boundary condition involving the Caputo-Katugampola type. The existence and uniqueness results are established by applying the fixed point theorems of Krasnoselskii and Banach. Further, by using generalized Gronwall inequality the Ulam-Hyers stability results are proved. To demonstrate the effectiveness of the main results, appropriate examples are granted.

Keywords: fractional differential equations, Katugampola fractional operator, Ulam-Hyers stability, fixed point theorems, fractional Gronwall inequality

Citation: Saleh S. Redhwan, Sadikali L. Shaikh, Mohammed S. Abdo. Implicit fractional differential equation with anti-periodic boundary condition involving Caputo-Katugampola type[J]. AIMS Mathematics, 2020, 5(4): 3714-3730. doi: 10.3934/math.2020240

Related Papers:

- [1] Arjumand Seemab, Mujeeb ur Rehman, Jehad Alzabut, Yassine Adjabi, Mohammed S. Abdo . Langevin equation with nonlocal boundary conditions involving a ψ -Caputo fractional operators of different orders. AIMS Mathematics, 2021, 6(7): 6749-6780. doi: 10.3934/math.2021397 (/article/doi/10.3934/math.2021397)
- [2] Thanin Sitthiwiratham, Rozi Gul, Kamal Shah, Ibrahim Mahariq, Jarunee Soontharanon, Khursheed J. Ansari . Study of implicit-impulsive differential equations involving Caputo-Fabrizio fractional derivative. AIMS Mathematics, 2022, 7(3): 4017-4037. doi: 10.3934/math.2022222 (/article/doi/10.3934/math.2022222)

- [3] H. H. G. Hashem, Hessah O. Alrashidi . Qualitative analysis of nonlinear implicit neutral differential equation of fractional order. *AIMS Mathematics*, 2021, 6(4): 3703-3719.
doi: 10.3934/math.2021220 (/article/doi/10.3934/math.2021220)
- [4] Fouzia Bekada, Saïd Abbas, Mouffak Benchohra, Juan J. Nieto . Dynamics and stability for Katugampola random fractional differential equations. *AIMS Mathematics*, 2021, 6(8): 8654-8666.
doi: 10.3934/math.2021503 (/article/doi/10.3934/math.2021503)
- [5] Abd-Allah Hyder, Mohamed A. Barakat, Doaa Rizk, Rasool Shah, Kamsing Nonlaopon . Study of HIV model via recent improved fractional differential and integral operators. *AIMS Mathematics*, 2023, 8(1): 1656-1671.
doi: 10.3934/math.2023084 (/article/doi/10.3934/math.2023084)
- [6] J. Vanterler da C. Sousa, E. Capelas de Oliveira, F. G. Rodrigues . Ulam-Hyers stabilities of fractional functional differential equations. *AIMS Mathematics*, 2020, 5(2): 1346-1358.
doi: 10.3934/math.2020092 (/article/doi/10.3934/math.2020092)
- [7] Qun Dai, Shidong Liu . Stability of the mixed Caputo fractional integro-differential equation by means of weighted space method. *AIMS Mathematics*, 2022, 7(2): 2498-2511.
doi: 10.3934/math.2022140 (/article/doi/10.3934/math.2022140)
- [8] Hasanen A. Hammad, Hassen Aydi, Hüseyin Işık, Manuel De la Sen . Existence and stability results for a coupled system of impulsive fractional differential equations with Hadamard fractional derivatives. *AIMS Mathematics*, 2023, 8(3): 6913-6941. doi: 10.3934/math.2023350 (/article/doi/10.3934/math.2023350)
- [9] Zaid Laadjal, Fahd Jarad . Existence, uniqueness and stability of solutions for generalized proportional fractional hybrid integro-differential equations with Dirichlet boundary conditions. *AIMS Mathematics*, 2023, 8(1): 1172-1194.
doi: 10.3934/math.2023059 (/article/doi/10.3934/math.2023059)
- [10] Dongming Nie, Usman Riaz, Sumbel Begum, Akbar Zada . A coupled system of \mathcal{P} -Laplacian implicit fractional differential equations depending on boundary conditions of integral type. *AIMS Mathematics*, 2023, 8(7): 16417-16445. doi: 10.3934/math.2023839 (/article/doi/10.3934/math.2023839)

This article has been cited by:

1. Basim N. Abood, Saleh S. Redhwan, Omar Bazighifan, Kamsing Nonlaopon, Investigating a Generalized Fractional Quadratic Integral Equation, 2022, 6, 2504-3110, 251, 10.3390/fractalfract6050251 (<https://doi.org/10.3390/fractalfract6050251>)
2. Saleh REDHWAN, Sadikali SHAIKH, Mohammed ABDO, Caputo-Katugampola-type implicit fractional differential equation with anti-periodic boundary conditions, 2022, 5, 2636-7556, 12, 10.53006/rna.974148 (<https://doi.org/10.53006/rna.974148>)
3. Hua Wang, Tahir Ullah Khan, Muhammad Adil Khan, Sajid Iqbal, New generalized conformable fractional impulsive delay differential equations with some illustrative examples, 2021, 6, 2473-6988, 8149, 10.3934/math.2021472 (<https://doi.org/10.3934/math.2021472>)
4. Mohammed D. Kassim, Thabet Abdeljawad, Saeed M. Ali, Mohammed S. Abdo, Stability of solutions for generalized fractional differential problems by applying significant inequality estimates, 2021, 2021, 1687-1847, 10.1186/s13662-021-03533-3 (<https://doi.org/10.1186/s13662-021-03533-3>)
5. Nemat Nyamoradi, Bashir Ahmad, Generalized Fractional Differential Systems with Stieltjes Boundary Conditions, 2023, 22, 1575-5460, 10.1007/s12346-022-00703-w (<https://doi.org/10.1007/s12346-022-00703-w>)

6. Ahmed Nouara, Abdelkader Amara, Eva Kaslik, Sina Etemad, Shahram Rezapour, Francisco Martinez, Mohammed K. A. Kaabar, A study on multiterm hybrid multi-order fractional boundary value problem coupled with its stability analysis of Ulam–Hyers type, 2021, 2021, 1687-1847, 10.1186/s13662-021-03502-w (<https://doi.org/10.1186/s13662-021-03502-w>)
7. Gauhar Ali, Kamal Shah, Ghaus ur Rahman, Investigating a Class of Pantograph Differential Equations Under Multi-points Boundary Conditions with Fractional Order, 2021, 7, 2349-5103, 10.1007/s40819-020-00932-0 (<https://doi.org/10.1007/s40819-020-00932-0>)
8. Fidel Meléndez-Vázquez, Guillermo Fernández-Anaya, Aldo Jonathan Muñoz-Vázquez, Eduardo Gamaliel Hernández-Martínez, Generalized conformable operators: Application to the design of nonlinear observers, 2021, 6, 2473-6988, 12952, 10.3934/math.2021749 (<https://doi.org/10.3934/math.2021749>)
9. Mohammed D. Kassim, Thabet Abdeljawad, Wasfi Shatanawi, Saeed M. Ali, Mohammed S. Abdo, A qualitative study on generalized Caputo fractional integro-differential equations, 2021, 2021, 1687-1847, 10.1186/s13662-021-03530-6 (<https://doi.org/10.1186/s13662-021-03530-6>)
10. Majid K. Neamah, Alawiah Ibrahim, Generalized proportional fractional integral inequalities for convex functions, 2021, 6, 2473-6988, 10765, 10.3934/math.2021625 (<https://doi.org/10.3934/math.2021625>)
11. Khalil S. Al-Ghafri, Awad T. Alabdala, Saleh S. Redhwan, Omar Bazighifan, Ali Hasan Ali, Loredana Florentina Iambor, Symmetrical Solutions for Non-Local Fractional Integro-Differential Equations via Caputo–Katugampola Derivatives, 2023, 15, 2073-8994, 662, 10.3390/sym15030662 (<https://doi.org/10.3390/sym15030662>)

Reader Comments

Your name: *

Email: *

Submit

We recommend

Langevin equation with nonlocal boundary conditions involving a ψ -Caputo fractional operators of different orders

Arjumand Seemab et al., AIMS Mathematics

On a class of Langevin equations in the frame of Caputo function-dependent-kernel fractional derivatives with antiperiodic boundary conditions

Abdelatif Boutiara et al., AIMS Mathematics, 2021

Existence and Hyers-Ulam type stability results for nonlinear coupled system of Caputo-Hadamard type fractional differential equations

Study of implicit-impulsive differential equations involving Caputo-Fabrizio fractional derivative
Thanin Sitthiwiratham et al., AIMS Mathematics, 2021


Investigation of Caputo proportional fractional integro-differential equation with mixed nonlocal conditions with respect to another function

Bounmy Khaminsou et al., AIMS Mathematics

Subramanian Muthaiah et al., AIMS Mathematics, 2020

Powered by **TREND MD**

© 2020 the Author(s), licensee AIMS Press. This is an open access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) (<http://creativecommons.org/licenses/by/4.0>)

 PDF view
(/aimspress-data/math/2020/4/PDF/.pdf)

Top

^

[About AIMS Press \(/index/news/solo-detail/about\)](/index/news/solo-detail/about)

[Open Access Policy \(/index/news/solo-detail/openaccesspolicy\)](/index/news/solo-detail/openaccesspolicy)

[Contact us \(/index/news/solo-detail/contact\)](/index/news/solo-detail/contact)

Copyright © AIMS Press