Kragujevac Journal of Mathematics

University of Kragujevac - Faculty of Science

Home   General policy   Editorial Board   Info for authors   All issues   Accepted papers   Online submission   Contact

Existence and Stability of Nonlocal Initial Value Problems Involving Generalized Katugampola Derivative

[PDF] **Download PDF**

Authors: A. S. BAGWAN AND D. B. PACHPATTE

Abstract:

In this paper, the existence results for the solutions to nonlocal initial value problems involving generalized Katugampola derivative are established. Some fixed point theorem techniques are used to derive the existence results. In the sequel, we investigate the generalized Ulam-Hyers-Rassias stability corresponding to our problem. Some examples are given to illustrate our main results.

Keywords:

Generalized Katugampola derivative, nonlocal initial value problem, Existence, Ulam-Hyers-Rassias stability.

References:

[1]   S. Abbas, M. Benchohra, J. Lagreg, A. Alsaedi and Y. Zhou, Existence and Ulam stability for fractional differential equations of Hilfer-Hadamard type, Adv. Difference Equ. 180 (2017), DOI 10.1186/s13662−017−1231−1.

[2]   B. Ahmad and S. K. Ntouyas, Initial value problem of fractional order Hadamard-type functional differential equations, Electron. J. Differential Equations 2015 (2015), 1–9.

[3]   A. O. Akdemir, A. Ekinci and E. Set, Conformable fractional integrals and related new integral inequalities, J. Nonlinear Convex Anal. 18 (2017), 661–674.

[4]   A. O. Akdemir, E. Set and A. Ekinci, On new conformable fractional integral inequalities for product of different kinds of convexity, TWMS Journal of Applied and Engineering Mathematics 9 (2019), 142–150.

[5]   R. Almeida, A. B. Malinowska and T. Odzijewicz, Fractional differential equations with dependence on the Caputo-Katugampola derivative, Journal of Computational and Nonlinear Dynamics 11 (2016), 11 pages.

[6]   M. Benchohra and J. E. Lazreg, On stability for nonlinear implicit fractional differential equations, Matematiche (Catania) 70 (2014), 49–61.

[7]   M. Benchohra and J. E. Lazreg, Existence and Ulam stability for nonlinear implicit fractional differential equations with Hadamard derivative, Stud. Univ. Babes-Bolyai Math. 62 (2017), 27–38.

[8]   D. B. Dhaigude and S. P. Bhairat, Existence and uniqueness of solution of Cauchy type problem for Hilfer fractional differential equations, Communications in Applied Analysis 22 (2018), 121–134.

[9]   D. B. Dhaigude and S. P. Bhairat, Existence and continuation of solutions of Hilfer fractional differential equations, J. Math. Model. 7 (2019), 1–20.

[10]   M. A. Dokuyucu, D. Baleanu and E. Celik, Analysis of the fractional Keller-Segel model, Filomat 32(16) (2018), 5633–5643.

[11]   M. A. Dokuyucu, E. Celik, H. Bulut and H. M. Baskonus, Cancer treatment model with the Caputo-Fabrizio fractional derivative, Eur. Phys. J. Plus 133 (2018), Paper ID 92, DOI 10.1140/epjp/i2018-11950-y.

[12]   A. Ekinci and N. Eroğlu, New generalizations for convex functions via conformable fractional integrals, Filomat 33(14) (2019), 4525–4534.

[13]   A. Ekinci and M. E. Özdemir, Some new integral inequalities via Riemann-Liouville integral operators, Appl. Comput. Math. 3 (2019), 288–295.

[14]   K. M. Furati, M. D. Kassim and N. e-. Tatar, Existence and uniqueness for a problem

Login:

Username:

Password:

LOGIN

Forgot your password?
Register

Latest issue

Kragujevac Journal of Mathematics Vol. 48 No.3 (2024)

involving Hilfer fractional derivative, Comput. Math. Appl. 64 (2012), 1616–1626.

[15]   K. M. Furati, M. D. Kassim and N. e-. Tatar, Non-existence of global solutions for a differential equations involving Hilfer fractional derivative, Electron. J. Differential Equations 2013 (2013), 1–10.

[16]   R. Hilfer, Fractional Time Evolution: Applications in Fractional Calculus in Physics, World Scientific, London, 2000.

[17]   R. Hilfer, Y. Luckho and Z. Tomovski, Operational method for the solution of fractional differential equations with generalized Riemann-Liouville fractional derivatives, Fract. Calc. Appl. Anal. 12 (2009), 289–318.

[18]   S. M. Jung, Hyers-Ulam-Rassias Stability of Functional Equations in Mathematical Analysis, Hadronic Press, Palm Harbor, 2001.

[19]   M. D. Kassim, K. M. Furati and N. -E. Tatar, On a differential equation involving Hilfer-Hadamard fractional derivative, Abstr. Appl. Anal. 2012 (2012), Article ID 391062, 17 pages.

[20]   U. N. Katugampola, New approach to a generalized fractional integral, Appl. Math. Comput. 218 (2011), 860–865.

[21]   U. N. Katugampola, A new approach to generalized fractional derivatives, Bull. Math. Anal. Appl. 6 (2014), 1–15.

[22]   A. A. Kilbas, Hadamard-type fractional calculus, J. Korean Math. Soc. 38 (2001), 1191–1204.

[23]   C. Kou, H. Zhou and M. Medved, Existence and continuation theorems of Riemann-Liouville type fractional differential equations, Internat. J. Bifur. Chaos Appl. Sci. Engrg. 22 (2011), Article ID 1250077, 12 pages.

[24]   K. D. Kucche and S. T. Sutar, Stability via successive approximation for nonlinear implicit fractional differential equations, Moroccan Journal of Pure and Applied Analysis 3 (2017), 36–55.

[25]   K. S. Miller and B. Ross, A Introduction to the Fractional Calculus and Differential Equations, John Wiley, New York, 1993.

[26]   I. Mumcu, E. Set and A. O. Akdemir, Hermite-Hadamard type inequalities for harmonically convex functions via Katugampola fractional integrals, Miskolc Math. Notes 20 (2019), 409–424.

[27]   D. S. Oliveira and E. C. de Oliveira, Hilfer-Katugampola fractional derivative, Comput. Appl. Math. 37 (2018), 3672–3690.

[28]   D. R. Smart, Fixed Point Theorems, Cambridge University Press, Cambridge, 1973.

[29]   R. Subashini, K. Jothimani, S. Saranya and C. Ravichandran, On the results of Hilfer fractional derivatives with nonlocal conditions, International Journal of Pure and Applied Mathematics 118 (2018), 277–289.

[30]   S. M. Ulam, A Collection of Mathematical Problems, Interscience, New York, 1968.

[31]   D. Vivek, K. Kanagrajan and E. M. Elsayed, Nonlocal initial value problems for implicit differential equations with Hilfer-Hadamard fractional derivative, Nonlinear Analysis: Modelling and Control 23 (2018), 341–360.

[32]   J. Wang and Y. Zhang, Nonlocal initial value problems for differential equations with Hilfer fractional derivative, Appl. Math. Comput. 266 (2015), 850–859.

[33]   J. Wang, Y. Zhou and M. Medved, Existence and stability of fractional differential equations with Hadamard derivative, Topol. Methods Nonlinear Anal. 41 (2013), 113–133.

[34]   H. Yaldiz and A. O. Akdemir, Katugampola fractional integrals within the class of convex functions, Turkish Journal of Science 3 (2018), 40–50.