EXISTENCE THEORY AND STABILITY RESULTS FOR ψ–TYPE COMPLEX–ORDER IMPLICIT DIFFERENTIAL EQUATIONS

D. VIVEK, S. K. NTOUYAS, K. KANAGARAJAN AND J. PRASANTH

Abstract. This paper concerns the existence and stability results for ψ-type complex-order implicit differential equations with boundary conditions. The results are based on the Banach contraction mapping principle. An example is presented to illustrate the main results.

Mathematics subject classification (2010): 26A33, 34A08.

Keywords and phrases: ψ-fractional derivative, boundary value problems, implict differential equations, existence, stability.

REFERENCES

[1] R. ALMEIDA, *A Caputo fractional derivative of a function with respect to another function*, Commun. Nonlinear Sci. Numer. Simul. **44** (2017), 460–481.

[2] O. BAGHANI, D. VIVEK, K. KANAGARAJAN, *Theory of hybrid fractional differential equations with complex order*, Sahand Communications in Mathematical Analysis **15** (1) (2019), 65–76.

[3] L. BYSZEWSKI, *Theorems about the existence and uniqueness of solutions of semilinear evoluation nonlocal Cauchy problem*, J. Math. Anal. Appl. **162** (1991), 494–505.

[4] E. M. ELSAYED, K. KANAGARAJAN, D. VIVEK, *On the existence and stability of solution of boundary value problem for fractional integro-differential equations with complex order*, Filomat **32** (8) (2018), 1–10.

[5] S. HARIKRISHNAN, R.W. IBRAHIM, K. KANAGARAJAN, *On ψ -Hilfer fractional differential equation with complex order*, Universal Journal of Mathematics and Applications **1** (1) (2018), 33–38.

[6] A.A. KILBAS, H.M. SRIVASTAVA, J.J. TRUJILLO, *Theory and Applications of Fractional Differential Equations*, in: North-Holland Mathematics Studies, vol. 204, Elsevier Science B.V., Amsterdam, 2006.

[7] V. LAKSHMIKANTHAM, S. LEELA, J. VASUNDHARA DEVI, *Theory of Fractional Dynamic Systems*, Cambridge Scientific Publishers, 2009.

[8] L. LIU, J.R. WANG, D. O'REGAN, *Ulam-Hyers-Mittag-Leffler stability for ψ -Hilfer fractional-order delay differential equations*, Adv. Difference Equ. (2019), **2019:50**.

[9] E.R. LOVE, *Fractional derivatives of imaginary order*, J. Lond. Math. Soc. (2) **2** (2-3) (1971), 241–259.

[10] K.S. MILLER, B. ROSS, *An Introduction to the Fractional Calculus and Differential Equations*, John Wiley, New York, 1993.

[11] I. PODLUBNY, *Fractional Differential Equations*, Academic Press, San Diego, 1999.

[12] S. G. SAMKO, A.A. KILBAS O. I. MARICHEV, *Fractional Integrals and Derivatives-Theory and Applications*, Gordon and Breach Science Publishers, Amsterdam, 1993.

[13] J. VANTERLER DA C. SOUSA, E. CAPELAS DE OLIVEIRA, *A Gronwall inequality and the Cauchy-type problem by means of ψ -Hilfer operator*, Differ. Equ. Appl. **11** (1) (2019), 87–106.

[14] D. VIVEK, E. M. ELSAYED, K. KANAGARAJAN, *Existence and Ulam stability results for a class of boundary value problem of neutral pantograph equations with complex order*, SEMA Journal, (2020).

[15] D. VIVEK, K. KANAGARAJAN, S. HARIKRISHNAN, *Dynamics and stability results of fractional pantograph equations with complex order*, Journal of Applied Nonlinear Dynamics **7** (2) (2018), 179–187.

[16] D. Vivek, K. Kanagarajan, S. Harikrishnan, *Dynamics and stability results of fractional integro-differential equations with complex order*, Discontinuity, Nonlinearity, and Complexity **7** (2) (2018), 119–127.

Differential Equations & Applications
www.ele-math.com
dea@ele-math.com