

## UNIFORMLY STABLE SOLUTION OF A NONLOCAL PROBLEM OF COUPLED SYSTEM OF DIFFERENTIAL EQUATIONS

A.M.A EL-SAYED, R.O. ABD-EL-RAHMAN AND M. EL-GENDY

*Abstract.* In this paper we are concerned with a nonlocal problem of a coupled system of differential equations. We study the local existence of the solution and its continuous dependence. The global existence and its uniform stability is being studied.

*Mathematics subject classification (2010):* 34B18, 34B10.

*Keywords and phrases:* coupled systems, nonlocal conditions, local existence, global existence, continuous dependence, stability.

### REFERENCES

- [1] A. BOUCHERIF AND R. PRECUP, *On the nonlocal initial value problem for first order differential equations*, Fixed Point Theory, **4**, 2 (2003), 205–212.
- [2] A. BOUCHERIF, *First-order differential inclusions with nonlocal initial conditions*, Applied Mathematics Letters, **15** (2002), 409–414, doi:10.1016/S0893-9659(01)00151-3.
- [3] A. BOUCHERIF, *Nonlocal Cauchy problems for first-order multivalued differential equations*, Electronic Journal of Differential Equations, **2002**, 47 (2002), 1–9.
- [4] A. BOUCHERIF, *Semilinear evolution inclusion with nonlocal conditions*, Applied Mathematics Letters, **22** (2009), 1145–1149, doi:10.1016/j.aml.2008.10.004.
- [5] L. BYSZEWSKI AND V. LAKSHMIKANTHAM, *Theorem about the existence and uniqueness of a solution of a nonlocal abstract Cauchy problem in a Banach space*, Applicable analysis, **40** (1991), 11–19, doi:10.1080/00036819008839989.
- [6] A. M. A. EL-SAYED AND SH. A. ABD EL-SALAM, *On the stability of a fractional-order differential equation with nonlocal initial condition*, Electron. J. Qual. Theory Differ. Equ., **2008**, 29, 8 p., (2008).
- [7] A. M. A. EL-SAYED AND I. AMEEN, *Continuation of a parameterized impulsive differential equation to an internal nonlocal Cauchy problem*, Alexandria Journal of Mathematics, **2**, 1 (2011).
- [8] A. M. A. EL-SAYED AND E. O. BIN-TAHER, *A nonlocal problem for a multi-term fractional order differential equation*, Int. J. Math. Anal., **5**, 29 (2011), 1445–1451.
- [9] A. M. A. EL-SAYED AND E. O. BIN-TAHER, *An arbitrary fractional order differential equation with internal nonlocal and integral conditions*, Advances in Pure Mathematics, **1**, 3 (2011), 59–62.
- [10] A. M. A. EL-SAYED AND E. O. BIN-TAHER, *Positive nondecreasing solutions for a multi-term fractional-order functional differential equation with internal conditions*, Electronic Journal of Differential Equations, **2011**, 166 (2011), 1–8.
- [11] A. M. A. EL-SAYED AND E. O. BIN-TAHER, *A nonlocal problem of an arbitrary fractional order differential equation*, Alexandria Journal of Mathematics, **1**, 2 (2010).
- [12] A. M. A. EL-SAYED AND KH. W. ELKADEKY, *Caratheodory theorem for a nonlocal problem of the differential equation*, Alexandria Journal of Mathematics, **1**, 2 (2010).
- [13] A. M. A. EL-SAYED, E. M. HAMDALLAH AND KH. W. ELKADEKY, *Internal nonlocal and integral condition problems of the differential equation*, J. Nonlinear Sci. Appl., **4**, 3 (2011), 193–199.
- [14] A. M. A. EL-SAYED, E. M. HAMDALLAH AND KH. W. ELKADEKY, *Uniformly stable positive monotonic solution of a nonlocal Cauchy problem*, Advances in Pure Mathematics, **2**, 2 (2012), 109–113, doi:10.4236/apm.2012.22015.

- [15] A. M. A EL-SAYED, E. M. HAMDALLAH AND KH. W. ELKADEKY, *Solution of a class of deviated-advanced nonlocal problems for the differential inclusion  $x'(t) \in F(t, x(t))$* , Abstract and Applied Analysis, **2011** Article ID 476392, 9 p., (2011), doi:10.1155/2011/476392.
- [16] E. GATSORI, S.K. NTOUYAS AND Y.G. SFICAS, *On a nonlocal Cauchy problem for differential inclusions*, Abstract and Applied Analysis, **2004** (2004), 425–434, doi:10.1155/S108533750430610X.
- [17] K. GOEBEL AND W.A. KIRK, *Topics in Metric Fixed Point Theory*, Cambridge University Press, (1990), 243 pages.
- [18] G. M. GUEREKATA, *A Cauchy problem for some fractional abstract differential equation with nonlocal conditions*, Nonlinear Analysis, **70** (2009), 1873–1876, doi:10.1016/j.na.2008.02.087.
- [19] O. NICA, *Initial-value problems for first-order differential systems with general nonlocal condition*, Electronic Journal of Differential Equations, **2012**, 74 (2012), 1–15.