

ON A FRACTIONAL DIFFERENTIAL INCLUSION WITH FOUR-POINT INTEGRAL BOUNDARY CONDITIONS

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Abstract. We study the existence of solutions for fractional differential inclusions of order $q \in (1, 2]$ with four-point integral boundary conditions. We establish Filippov type existence results in the case of nonconvex set-valued maps.

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References

- [1] B. Ahmad, S. K. Ntouyas, *Boundary value problems for fractional differential inclusions with four-point integral boundary conditions*, Surveys Math. Appl. **6** (2011), 175-193. [MR2970722](#).
- [2] E. Ait Dads, M. Benchohra, S. Hamani, *Impulsive fractional differential inclusions involving Caputo fractional derivative*, Fract. Calc. Appl. Anal. **12** (2009), 15-38. [MR2494428\(2009m:34018\)](#). [Zbl 1179.26012](#).
- [3] J. P. Aubin, A. Cellina, *Differential Inclusions*, Springer, Berlin, 1984. [MR0755330\(85j:49010\)](#). [Zbl 0538.34007](#).
- [4] C. Castaing, M. Valadier, *Convex Analysis and Measurable Multifunctions*, Springer, Berlin, 1977. [MR08467319\(57 #7169\)](#). [Zbl 0346.46638](#).
- [5] A. Cernea, *An existence result for a Fredholm-type integral inclusion*, Fixed Point Theory **9** (2008), 441-447. [MR2464124\(2009i:34019\)](#). [Zbl 1162.45003](#).
- [6] A. Cernea, *On the existence of solutions for fractional differential inclusions with boundary conditions*, Fract. Calc. Appl. Anal. **12** (2009), 433-442. [MR2598190\(2010m:34018\)](#). [Zbl 1206.34011](#).

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- [7] A. Cernea, *A note on the existence of solutions for some boundary value problems of fractional differential inclusions*, *Fract. Calc. Appl. Anal.* **15** (2012), 183-194. [MR2897772](#). [Zbl 06194281](#).
- [8] Y.K. Chang, J.J. Nieto, *Some new existence results for fractional differential inclusions with boundary conditions*, *Mathematical and Computer Modelling* **49** (2009), 605-609. [MR2483665\(2009m:34020\)](#).
- [9] H. Covitz, S.B. Nadler jr., *Multivalued contraction mapping in generalized metric spaces*, *Israel J. Math.* **8** (1970), 5-11. [MR0263062\(41 #7667\)](#). [Zbl 0192.59802](#).
- [10] A.F. Filippov, *Classical solutions of differential equations with multivalued right hand side*, *SIAM J. Control* **5** (1967), 609-621. [MR0220995\(36 #4047\)](#). [Zbl 0238.34010](#).
- [11] Z. Kannai, P. Tallos, *Stability of solution sets of differential inclusions*, *Acta Sci. Math. (Szeged)* **61** (1995), 197-207. [MR1377359\(96m:34027\)](#). [Zbl 0851.34015](#).
- [12] A.A. Kilbas, H.M. Srivastava, J.J. Trujillo, *Theory and Applications of Fractional Differential Equations*, Elsevier, Amsterdam, 2006. [MR2218073\(2007a:34002\)](#). [Zbl 1092.45003](#).
- [13] T.C. Lim, *On fixed point stability for set-valued contractive mappings with applications to generalized differential equations*, *J. Math. Anal. Appl.* **110** (1985), 436-441. [MR0805266\(86m:47086\)](#). [Zbl 0593.47056](#).
- [14] I. Podlubny, *Fractional Differential Equations*, Academic Press, San Diego, 1999. [MR1658022\(99m:26009\)](#). [Zbl 0924.34008](#).
- [15] P. Tallos, *A Filippov-Gronwall type inequality in infinite dimensional space*, *Pure Math. Appl.* **5** (1994), 355-362. [MR1343457\(96e:34033\)](#). [Zbl 0827.34008](#).

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