FIXED POINTS, MULTI-VALUED UNIFORMLY LIPSCHITZIAN MAPPINGS AND UNIFORM NORMAL STRUCTURE

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Abstract. Khamsi and Kirk [11] gave the definition of multi-valued uniformly Lipschitzian mappings via generalized orbits. We will prove a fixed point theorem in metric spaces with uniform normal structure which extends Lim and Xu's theorems [13] to multi-valued uniformly Lipschitzian mappings. We also give a fixed point result for multi-valued uniformly Lipschitzian mappings in hyperconvex spaces.

Key Words and Phrases: Fixed point, convexity structure, multi-valued mapping, normal structure coefficient, uniform normal structure.

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References

[1] R.P. Agarwal, D. O'Regan, D.R. Sahu, *Fixed Point Theory for Lipschitzian-type Mappings with Applications*, Springer Science and Business Media, Dordrecht 2009.

[2] J.M. Ayerbe Toledano, T. Domínguez Benavides, G. López Acedo, *Measures of Noncompactness in Metric Fixed Point Theory*, Birkhäuser Verlag, Basel 1997.

[3] J.B. Baillon, *Quelques aspects de la théorie des points fixes dan les espaces de Banach I*, in: Séminare d'Analyse Fonctionnelle de l'École Polytechnique VII (1978-1979), École Polytechnique, Palaiseau, 1979.

[4] W.L. Bynum, *Normal structure coefficients for Banach spaces*, Pacific J. Math., **86**(1980), 427-436.

[5] E. Casini, E. Maluta, *Fixed points of uniformly Lipschitzian mappings in spaces with uniformly normal structure*, Nonlinear Anal., **9**(1985), 103-108.

[6] T. Domínguez Benavides, *Fixed point theorems for uniformly Lipschitzian mappings and asymptotically regular mappings*, Nonlinear Anal., **32**(1998), 15-27.

[7] N. Dunford, J.T. Schwartz, *Linear Operators, Part 1*, Interscience, New York 1958.

[8] R. Espínola, M.A. Khamsi, *Introduction to hyperconvex spaces*, in: W.A. Kirk, B. Sims (eds.), *Handbook of Metric Fixed Point Theory*, Kluwer, Dordrecht 2001, 391-435.

[9] K. Goebel, W.A. Kirk, *A fixed point theorem for transformations whose iterates have uniform Lipschitz constant*, Studia Math., **47**(1973), 135-140.

[10] J. Górnicki, *Fixed point theorems for multi-valued uniformly Lipschitzian mappings in Banach and metric spaces*, J. Nonlinear Convex Anal., **17**(2016), 2455-2467.

[11] M.A. Khamsi, W.A. Kirk, *On uniformly Lipschitzian multivalued mappings in Banach and metric spaces*, Nonlinear Anal., **72**(2010), 2080-2085.

[12] E.A. Lifshitz, *A fixed point theorem for operators in strongly convex spaces*, (Russian), Voronez. Gos. Univ. Trudy Mat. Fak., **16**(1975), 23-28.

[13] T.C. Lim, H.K. Xu, *Uniformly Lipschitzian mappings in metric spaces with uniform normal structure*, Nonlinear Anal., **25**(1995), 1231-1235.

[14] S.B. Nadler, *Multi-valued contraction mappings*, Pacific J. Math., **30**(1969), 475-488.