

Suzuki ψF -contractions and some fixed point results

NICOLAE-ADRIAN SECELEAN

ABSTRACT.

The purpose of this paper is to combine and extend some recent fixed point results of Suzuki, T., [A new type of fixed point theorem in metric spaces, *Nonlinear Anal.*, **71** (2009), 5313–5317] and Secelean, N. A. & Wardowski, D., [ψF -contractions: not necessarily nonexpansive Picard operators, *Results Math.*, **70** (2016), 415–431]. The continuity and the completeness conditions are replaced by orbitally continuity and orbitally completeness respectively. It is given an illustrative example of a Picard operator on a non complete metric space which is neither nonexpansive nor expansive and has a unique continuity point.

Acknowledgements. Project financed by Lucian Blaga University of Sibiu research grants LBUS-IRG-2017-03.

REFERENCES

- [1] Balakrishnan, R. and Ranganathan, K., *A Textbook of Graph Theory, second edition*, Springer-Verlag New York, 2012
- [2] Ćirić, Lj., *On contraction type mappings*, *Math. Balkanica*, **1** (1971), 52–57
- [3] Cosentino, M. and Vetro, P., *Fixed Point Results for F-Contractive Mappings of Hardy-Rogers-Type*, *Filomat*, **28** (2014), No. 4, 715–722
- [4] Dănciulescu, D. and Colhon, M., *Systems of knowledge representation based on stratified graphs. Application to Natural Language Generation*, *Carpathian J. Math.*, **32** (2016), No. 1, 49–62
- [5] Edelstein, M., *On fixed and periodic points under contractive mappings*, *J. Lond. Math. Soc.*, **37** (1962), 74–79
- [6] Hussain, N. and Salimi, P., *Suzuki-Wardowski Type Fixed Point Theorems for α -GF-contractions*, *Taiwanese J. Math.*, **18** (2014), No. 6, 1879–1895
- [7] Karapinar, E. et al., *Fixed points of conditionally F -contractions in complete metric-like spaces*, *Fixed Point Theory Appl.*, (2015) 2015:126
- [8] Klim, D. and Wardowski, D., *Fixed points of dynamic processes of set-valued F-contractions and application to functional equations*, *Fixed Point Theory Appl.*, (2015) 2015:22
- [9] Miculescu, R. and Mihail, A., *Reich-type iterated function systems*, *J. Fixed Point Theory Appl.*, **18** (2016), No. 2, 285–296
- [10] Minak, G., Helvacı, A. and Altun, I., *Ćirić type generalized F-contractions on complete metric spaces and fixed point results*, *Filomat* **28:6** (2014), 1143–1151
- [11] Negru, V., Grigora, G. and Dănciulescu, D., *Natural Language Agreement in the Generation Mechanism based on Stratified Graphs*, *Proceedings of the 7th Balkan Conference in Informatics (BCI 2015)*, Craiova, Romania, 36:136:8,
- [12] Paesano, D. and Vetro, C., *Multi-valued F-contractions in 0-complete partial metric spaces with application to Volterra type integral equation*, *RACSAM* **108** (2014), 1005–1020
- [13] Piri, H. and Kumam, K., *Fixed point theorems for generalized F-Suzuki-contraction mappings in complete b-metric spaces*, *Fixed Point Theory Appl.*, (2016) 2016:90
- [14] Piri, H. and Kumam, K., *Some fixed point theorems concerning F-contraction in complete metric spaces*, *Fixed Point Theory Appl.*, 2014:210
- [15] Rhoades, B. E., *A Comparison of Various Definitions of Contractive Mappings*, *Trans. Amer. Math. Soc.*, **226** (1977), 257–290
- [16] Rus, I. A., *Picard operators and applications*, *Sci. Math. Japon.*, **58** (2003), 191–219

Received: 16.10.2016; In revised form: 08.06.2017; Accepted: 15.06.2017

2010 *Mathematics Subject Classification.* 47H09, 47H10, 45D05.

Key words and phrases. ψF -contraction, F-contraction, nonexpansive, expansive, fixed point, Picard operator, Suzuki contraction.

- [17] Rus, I. A., *Generalized Contractions and Applications*, Cluj University Press, Cluj-Napoca, 2001
- [18] Rus, I. A., Petruşel, A. and Petruşel G., *Fixed Point Theory*, Cluj University Press, 2008
- [19] Secelean, N. A., *Weak F-contractions and some fixed point results*, Bull. Iranian Math. Soc., **42** (2016), No. 3, 779–798
- [20] Secelean, N. A. and Wardowski, D., ψF -contractions: not necessarily nonexpansive Picard operators, Results. Math., **70** (2016), 415–431
- [21] Secelean, N. A., *Generalized F-iterated function systems on product of metric spaces*, J. Fixed Point Theory Appl., **17** (2015), No. 3, 575–595
- [22] Secelean, N. A., *Iterated function systems consisting of F-contractions*, Fixed Point Theory Appl., (2013) 2013:277
- [23] Sgroi, M. and Vetro, C., *Multi-valued F-contractions and the solution of certain functional and integral equations*, Filomat **27** (2013), 1259–1268
- [24] Suzuki, T., *A new type of fixed point theorem in metric spaces*, Nonlinear Anal., **71** (2009), 5313–5317
- [25] Turinici, M., *Wardowski implicit contractions in metric spaces*, arXiv:1212.3164v2 [Math.GN]
- [26] Udo-utun, X., *On inclusion of F-contractions in (δ, k) -weak contractions*, Fixed Point Theory Appl., 2014, 2014:65, 6 pp.
- [27] Vetro, F., *F-contractions of Hardy-Rogers type and application to multistage decision processes*, Nonlinear Anal. Model. Control, **21** (2016), No. 4, 531–546
- [28] Wardowski, D. and Dung, N. V., *Fixed points of F-weak contractions on complete metric spaces*, Demonstr. Math, **47** (2014), 146–155
- [29] Wardowski, D., *Fixed points of a new type of contractive mappings in complete metric spaces*, Fixed Point Theory Appl., (2012), 2012:94

DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCES
LUCIAN BLAGA UNIVERSITY OF SIBIU
STR. DR. IOAN RATIU NO. 5-7, 550012 SIBIU, ROMANIA
E-mail address: nicolae.secelean@ulbsibiu.ro