Dedicated to Prof. Billy E. Rhoades on the occasion of his 90th anniversary

Fixed point theorems and convergence theorems for some monotone generalized nonexpansive mappings

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ABSTRACT.

We present some new coincidence fixed point theorems for generalized multi-valued weak Γ -contraction mappings. Our outcomes extend several recent results in the framework of complete metric spaces endowed with a graph. Two illustrative examples are included and some consequences are derived.

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REFERENCES

- [1] Alfuraidan, M. R. and Ansari, Q. H., *Fixed point theory and graph theory, foundations and integrative approaches,* Elsevier, 2016
- [2] Alfuraidan, M. R. and Khamsi, M. A., A fixed point theorem for monotone asymptotically nonexpansive mappings, Proc. Amer. Math. Soc., 146 (2018), 2451–2456
- [3] Bachar, M. and Khamsi, M. A., *Fixed points of monotone mappings and application to integral equations*, Fixed Point Theory Appl., 2015, 2015:110, 7 pp.
- [4] Bachar, M. and Khamsi, M. A., Recent contributions to fixed point theory of monotone mappings, J. Fixed Point Theory Appl., 19 (2017), No. 3, 1953–1976
- [5] Beauzamy, B., Introduction to Banach spaces and their geometry, North-Holland, 1982
- [6] Beg, I., Butt, A. R. and Radojevic, S., The contraction principle for set valued mappings on a metric space with a graph, Comput. Math. Appl., 60 (2010), No. 5, 1214–1219
- [7] Carl, S. and Heikkilä, S., Fixed point theory in ordered sets and applications: from differential and integral equations to game theory, Springer, 2011
- [8] Goebel, K. and Kirk, W. A., Iteration processes for nonexpansive mappings, Contemp. Math., 21 (1983), 115–123
- [9] Khamsi, M. A. and Kirk, W. A., An introduction to metric spaces and fixed point theory, John Wiley, 2001
- [10] Krasnoselskij, M. A., Two remarks on the method of successive approximations (Russian), Uspehi Mat. Nauk. 10 (1955), 123–127
- [11] Opial, Z., Weak convergence of the sequence of successive approximations for nonexpansive mappings, Bull. Amer. Math. Soc., 73 (1967), 591–597
- [12] Petrusel, A. and Rus, I., Fixed point theory in terms of a metric and of an order relation, Fixed Point Theory, 20 (2019), No. 2, 601–622
- [13] Ran, A. C. M. and Reurings, M. C. B., A fixed point theorem in partially ordered sets and some applications to matrix equations, Proc. Amer. Math. Soc., 132 (2004), No. 5, 1435–1443
- [14] Suzuki, T., Krasnoselskii and Mann's type sequences and Ishikawa's strong convergence theorem, W. Takahashi, T. Tanaka (Eds.), Proceedings of the third international conference on nonlinear analysis and convex analysis, Yokohama, 2004, 527–539

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- [15] Suzuki, T., Fixed point theorems and convergence theorems for some generalized nonexpansive mappings, J. Math. Anal. Appl., 340 (2008), 1088–1095
- [16] Turinici, M., Fixed points for monotone iteratively local contractions, Dem. Math., 19 (1986), 171-180

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