## Fixed points for weakly compatible mappings satisfying an implicit relation in partially ordered metric spaces

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## ABSTRACT.

Let  $(X, d, \preceq)$  be a partially ordered metric space. Let F, G be two set valued mappings and f, g two single valued mappings on X. We obtained sufficient conditions for existence of common fixed point of F, G, f and g satisfying an implicit relation in X.

## REFERENCES

- [1] Agarwal, R. P., El-Gebeily, M. A. and O'Regan, D., Generalized contractions in partially ordered metric spaces, Appl. Anal. 87 (2008), 109–116
- [2] Altun, I., *Fixed point and homotopy results for multivalued maps satisfying an implicit relation*, J. Fixed Point Theory and Appl., (to appear)
- [3] Altun, I., Hanger, H. A. and Türkoğlu, D., A fixed point theorem for multi-maps satisfying an implicit relation on metrically convex metric spaces, Math. Commun. 11 (2006), 17–23
- [4] Altun, I. and Türkoğlu, D., Fixed point and homotopy results for mappings satisfying an implicit relation, Discuss. Math. Differ. Incl. Control Optim. 27 (2007), 349–363
- [5] Altun, I., Türkoğlu, D. and Rhoades, B. E., *Fixed points of weakly compatible maps satisfying a general contractive condition of integral type*, Fixed Point Theory and Appl., (to appear)
- [6] Beg, I. and Butt, A. R., Fixed point for set valued mappings satisfying an implicit relation in partially ordered metric spaces, Nonlinear Anal. (2009), doi:10.1016/j.na.2009.02.027, (to appear)
- [7] Bouhadjera, H. and Djoudi, A., Common fixed point theorem for single and set valued maps satisfying a strict contractive condition, Math. Commun. 13 (2008), 27–32
- [8] Cabada A. and Nieto, J. J., Fixed points and approximate solutions for nonlinear operator equations, J. Comput. Appl. Math. 113 (2000), 17–25
- [9] Djoudi, A. and Nisse, L., *Gregus type fixed points for weakly compatible maps*, Bull. Belg. Math. Soc. **10** (2003), 369–378
- [10] Drici, Z., McRae, F. A. and Devi, J. V., Fixed point theorems in partially ordered metric space for operators with PPF dependence, Nonlinear Anal. 67 (2007), 641–647
- [11] Echenique, F., A short and constructive proof of Tarski's fixed-point theorem, Int. J. Game Theory, 33 (2) (2005), 215–218
- [12] Gnana, T., Bhaskar and Lakshmikantham, V., Fixed point theorems in partially ordered metric spaces and applications, Nonlinear Anal., 65 (2006), 1379–1393
- [13] Granas, A. and Dugundji, J., Fixed Point Theory, Springer-Verlag, New York, 2003
- [14] Harjani, J. and Sadarangani, K., Fixed point theorems for weakly contractive mappings in partially ordered sets, Nonlinear Anal., doi:10.1016/j.na.2009.01.240, (to appear)
- [15] Jungck, G., Compatible mappings and common fixed points, Int. J. Math. Math. Sci, 9 (1986), 771-779
- [16] Jungck, G. and Rhoades, B. E., Fixed point for set valued functions without continuity, Indian J. Pure Appl. Math. 29 (3) (1998), 227-238
- [17] Kirk, W. A. and Goebel, K., Topics in Metric Fixed Point Theory, Cambridge University Press, Cambridge 1990
- [18] Lakshmikantham, V. and Ciric, L., Coupled fixed point theorems for nonlinear contractions in partially ordered metric spaces, Nonlinear Anal. doi:10.1016/j.na.2008.09.020. (to appear)
- [19] Nieto, J. J., Applications of contractive-like mapping principles to fuzzy equations, Rev. Mat. Complut. 19 (2006), 361–383
- [20] Nieto, J. J., Pouso R. L. and Rodríguez-López, R., Fixed point theorems in ordered abstract spaces, Proc. Amer. Math. Soc. 135 (2007), 2505–2517
- [21] Nieto, J. J. and Rodríguez-López, R., *Existence of extremal solutions for quadratic fuzzy equations*, Fixed Point Theory and Appl. 2005 (3) (2005), 321–342
- [22] Nieto, J. J. and Rodríguez-López, R., Contractive mapping theorms in partially ordered sets and applications to ordinary differential equations, Order 22 (2005), 223–239
- [23] Nieto, J. J. and Rodríguez-López, R., Existence and uniqueness of fixed point in partially ordered sets and applications to ordinary differential equations, Acta. Math. Sinica, (English Ser.) 23 (2007), 2205–2212
- [24] O'Regan, D. and Petruşel, A., Fixed point theorems for generalized contractions in ordered metric spaces, J. Math. Anal. Appl. 341 (2008), 1241–1252
- [25] Petruşel, A. and Rus, I. A., Fixed point theorems in ordered L-spaces, Proc. Amer. Math. Soc. 134 (2005), 411-418
- [26] Petruşel, G., Fixed points for multivalued Ćirić-type operators, Fixed Point Theory 9 (1) (2008), 227-231
- [27] Ran, A. C. M. and Reurings, M. C. B., A fixed point theorm in partially ordered sets and some applications to matrix equations, Proc. Amer. Math. Soc. 132 (2003), 1435–1443
- [28] Sedhgi, S., Altun, I. and Shobe, N., A fixed point theorem for multi-maps satisfying an implicit relation on metric spaces, Appl. Anal. Discrete Math. 2 (2008), 189–196
- [29] Tarski, A., A lattice theoretical fixed point theorem and its application, Pacific J. Math. 5 (1955), 285–309

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