

SUZUKI TYPE COMMON FIXED POINT THEOREMS AND APPLICATIONS

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Abstract. Common fixed point theorems for Suzuki type conditions for a pair of maps on a metric space are obtained. Existence of a common solution for a class of functional equations arising in dynamic programming is also discussed.

Key Words and Phrases: Fixed point; Banach contraction theorem, functional equations, dynamic programming.

2010 Mathematics Subject Classification: 47H10, 54H25.

Acknowledgement. The authors thank the referee for his appreciation and suggestions to improve upon the original typescript. The first author (SLS) acknowledges the support by the UGC, New Delhi under Emeritus Fellowship.

REFERENCES

- [1] R. Baskaran, P.V. Subrahmanyam, *A note on the solution of a class of functional equations*, *Applicable Anal.*, **22**(1986), no. 3-4, 235-241.
- [2] R. Bellman, *Methods of Nonlinear Analysis*, Vol. II, Academic Press, New York, 1973.
- [3] R. Bellman, E.S. Lee, *Functional equations in dynamic programming*, *Aequationes Math.*, **17**(1978), no. 1, 1-18.
- [4] P.C. Bhakta, S. Mitra, *Some existence theorems for functional equations arising in dynamic programming*, *J. Math. Anal. Appl.*, **98**(1984), no. 2, 348-362.
- [5] S.K. Chatterjea, *Fixed-point theorems*, *C.R. Acad. Bulgare Sci.*, **25**(1972), 727-730.
- [6] S. Dhompongsa, H. Yingtaweessittikul, *Fixed points for multivalued mappings and the metric completeness*, *Fixed Point Theory Appl.*, **2009**(2009), Art. ID 972395, 15 pp.
- [7] D. Dorić, R. Lazović, *Some Suzuki-type fixed point theorems for generalized multivalued mappings and applications*, *Fixed Point Theory Appl.*, **2011**(2011), 2011:40, 13 pp.
- [8] G.E. Hardy, T.D. Rogers, *A generalization of a fixed point theorem of Reich*, *Canad. Math. Bull.*, **16**(1973), 201-206.
- [9] R. Kannan, *Some results on fixed points*, *Bull. Calcutta Math. Soc.*, **60**(1968), 71-76.
- [10] R. Kannan, *Some results on fixed points. II*, *Amer. Math. Monthly*, **76**(1969), 405-408.

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- [11] M. Kikkawa, T. Suzuki, *Three fixed point theorems for generalized contractions with constants in complete metric spaces*, *Nonlinear Anal.*, **69**(2008), no. 9, 2942-2949.
- [12] G. Mot, A. Petruşel, *Fixed point theory for a new type of contractive multi-valued operators*, *Nonlinear Anal.*, **70**(2009), no. 9, 3371-3377.
- [13] H.K. Pathak, Y.J. Cho, S.M. Kang, B.S. Lee, *Fixed point theorems for compatible mappings of type (P) and applications to dynamic programming*, *Le Mathematiche*, **50**(1995), no. 1, 15-33.
- [14] O. Popescu, *Two fixed point theorems for generalized contractions with constants in complete metric space*, *Central Europ. J. Math.*, **7**(2009), no. 3, 529-538.
- [15] S. Reich, *Remarks on fixed points II*, *Atti Accad. Naz. Lincei Rend. Cl. Sci. Fis. Mat. Natur.*, **53**(1972), no. 8, 250—254.
- [16] B.E. Rhoades, *A comparison of various definitions of contractive mappings*, *Trans. Amer. Math. Soc.*, **226**(1977), 257-290.
- [17] I.A. Rus, *On common fixed points*, *Studia Univ. Babeş-Bolyai Ser. Math.-Mech.*, **18**(1973), 31-33.
- [18] I.A. Rus, *Generalized Contractions and Applications*, Cluj-Napoca, 2001.
- [19] S.L. Singh, S.N. Mishra, *On a Ljubomic Ćirić fixed point theorem for nonexpansive type maps with applications*, *Indian J. Pure Appl. Math.*, **33**(2002), no. 4, 531-542.
- [20] S.L. Singh, H.K. Pathak, S.N. Mishra, *On a Suzuki type general fixed point theorem with applications*, *Fixed Point Theory Appl.*, **2010**(2010), 15 pp.
- [21] S.L. Singh, S.N. Mishra, *Coincidence theorems for certain classes of hybrid contractions*, *Fixed Point Theory Appl.*, **2010**(2010), Art. ID 898109, 14 pp.
- [22] S.L. Singh, S.N. Mishra, *Remarks on recent fixed point theorems*, *Fixed Point Theory Appl.*, **2010**(2010), Art. ID 452905, 18 pp.
- [23] T. Suzuki, *A generalized Banach contraction principle that characterizes metric completeness*, *Proc. Amer. Math. Soc.*, **136**(2008), no. 5, 1861-1869.
- [24] C.S. Wong, *Common fixed points of two mappings*, *Pacific J. Math.*, **48**(1973), 299-312.

Received: October 24, 2011; Accepted: March 9, 2012.

