

GENERALIZED MEIR-KEELER TYPE CONTRACTIONS AND DISCONTINUITY AT FIXED POINT

RAVINDRA K. BISHT* AND VLADIMIR RAKOČEVIĆ**

*Department of Mathematics, National Defence Academy
Khadakwasla, Pune, India
E-mail: ravindra.bisht@yahoo.com

**University of Nis, Faculty of Sciences and Mathematics
Visegradska 33, 18000 Nis, Serbia
E-mail: vrakoc@sbb.rs

Abstract. In this paper, we show that generalized Meir-Keeler type contractive definitions are strong enough to generate a fixed point but do not force the mapping to be continuous at the fixed point. Thus we provide more answers to the open question posed by B.E. Rhoades in the paper *Contractive definitions and continuity*, Contemporary Mathematics 72(1988), 233-245.

Key Words and Phrases: Fixed point, $(\varepsilon - \delta)$ contractions, power contraction, orbital continuity.

2010 Mathematics Subject Classification: 47H09, 54E50, 47H10, 54E40.

Acknowledgment. The authors are thankful to the learned referee for suggesting some improvements and thereby removing certain obscurities in the presentation.

REFERENCES

- [1] R.K. Bisht, R.P. Pant, *A remark on discontinuity at fixed point*, J. Math. Anal. Appl., **445**(2017), 1239-1241.
- [2] D.W. Boyd, J.S. Wong, *On nonlinear contractions*, Proc. Amer. Math. Soc., **20**(1969), 458-464.
- [3] V.W. Bryant, *A remark on a fixed point theorem for iterated mappings*, Amer. Math. Monthly, **75**(1968), no. 4, 399-400.
- [4] Lj. B. Ćirić, *Fixed points of weakly contraction mappings*, Publ. Inst. Math., **20**(34)(1976), 79-84.
- [5] Lj. B. Ćirić, *A new fixed point theorem for contractive mapping*, Publ. Inst. Math., **30**(44)(1981), 25-27.
- [6] K.J. Chung, *On fixed point theorems of Meir and Keeler*, Math. Japon., **23**(1978), 381-383.
- [7] J. Jachymski, *Equivalent conditions and Meir-Keeler type theorems*, J. Math. Anal. Appl., **194**(1995), 293-303.
- [8] G. Jungck, K.B. Moon, S. Park, B.E. Rhoades, *On generalizations of the Meir-Keeler type contraction maps: Corrections*, J. Math. Anal. Appl., **180**(1993), 221-222.
- [9] R. Kannan, *Some results on fixed points, II*, Amer. Math. Monthly, **76**(1969), 405-408.
- [10] M. Kuczma, B. Choczewski, R. Ger, *Iterative Functional Equations, Encyclopedia of Mathematics and its Applications*, Vol. 32, Cambridge Univ. Press, Cambridge, UK, 1990.

- [11] A. Kumar, S.L. Singh, S.N. Mishra, M.M. Milovanovic-Arandjelovic, *Coincidences and fixed points of new Meir-Keeler type contractions and applications*, Fixed Point Theory, **15**(2014), no. 1, 117-134.
- [12] T.C. Lim, *On Characterizations of Meir-Keeler contractive maps*, Nonlinear Anal., **46**(2001), 113-120.
- [13] M. Maiti, T.K. Pal, *Generalizations of two fixed point theorems*, Bull. Cal. Math. Soc., **70**(1978), 59-61.
- [14] J. Matkowski, *Integrable solutions of functional equations*, Diss. Math., **127**(1975), 1-68.
- [15] J. Matkowski, R. Wegrzyk, *On equivalence of some fixed point theorems for self mappings of metrically convex spaces*, Boll. Un. Mat. Ital., A(5), **15**(1978), 359-369.
- [16] A. Meir, E. Keeler, *A theorem on contraction mappings*, J. Math. Anal. Appl., **28**(1969), 326-329.
- [17] M. Nabieia, T. Ezzati, *A novel fixed point theorem for the k-Meir-Keeler function*, Quaestiones Math., **39**(2016), no. 2, 245-250.
- [18] R.P. Pant, *Discontinuity and fixed points*, J. Math. Anal. Appl., **240**(1999), 284-289.
- [19] R.P. Pant, *A comparison of contractive definitions*, J. Indian Math. Soc., **72**(2005), 241-249.
- [20] R.P. Pant, *Common fixed points of two pairs of commuting mappings*, Indian J. Pure Appl. Math., **17**(1986), 187-192.
- [21] S. Park, J.S. Bae, *Extension of a fixed point theorem of Meir-Keeler*, Ark. Math., **19**(1991), 223-228.
- [22] S. Park, B.E. Rhoades, *Meir-Keeler type contractive conditions*, Math. Japon., **26**(1981), 13-20.
- [23] S. Park, *On general contractive type conditions*, J. Korean Math. Soc., **17**(1980), 131-140.
- [24] I.H.N. Rao, K.P.R. Rao, *Generalizations of fixed point theorems of Meir and Keeler type*, Indian J. Pure Appl. Math., **16**(1985), 1249-1262.
- [25] B.E. Rhoades, *A comparison of various definitions of contractive mappings*, Trans. Amer. Math. Soc., **226**(1977), 257-290.
- [26] B.E. Rhoades, *Contractive definitions and continuity*, Contemporary Mathematics, **72**(1988), 233-245.
- [27] I.A. Rus, *Some variants of contraction principle, generalizations and applications*, Stud. Univ. Babeş-Bolyai Math., **61**(2016), no. 3, 343-358.
- [28] K.P.R. Sastry, G.V.R. Babu, M.V.R. Kameswari, *Fixed points of strip ϕ -contractions*, Math. Commun., **14**(2009), no. 2, 183-192.
- [29] S.L. Singh, A. Kumar, Y.J. Cho, *Fixed points of Meir-Keeler type hybrid contractions*, Pan Amer. Math. J., **16**(2006), 35-54.
- [30] P.V. Subrahmanyam, *Some aspects of fixed point theory*, Resonance, **5**(2000), no. 5, 36-44.
- [31] T. Suzuki, *Some notes on Meir-Keeler contractions and L-function*, Bull. Kyushu Inst. Tech., **53**(2006), 1-13.

Received: October 19, 2016; Accepted: June 14, 2017.