

## SATURATED VERSIONS OF SOME FIXED POINT THEOREMS FOR GENERALIZED CONTRACTIONS

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**Abstract.** In this paper, we will give extended versions of two standard fixed point principles: one for Hardy-Rogers type operators and the other one for Ćirić type operators in complete metric space. Our results generalize similar theorems given in [9].

**Key Words and Phrases:** Fixed point, complete metric space, Hardy-Rogers type operators, Ćirić type operators, well-posed property, Ostrowski property, quasi-contraction.

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### REFERENCES

- [1] V. Berinde, *Iterative Approximation of Fixed Points*, Springer, Berlin, 2007.
- [2] V. Berinde, Şt. Măruşter, I.A. Rus, *Saturated contraction principles for non self operators, generalizations and applications*, *Filomat*, **31**(2017), 3391-3406.
- [3] Lj.B. Ćirić, *A generalization of Banach's contraction principle*, *Proc. Amer. Math. Soc.*, **45**(1974), no. 2, 267-273.
- [4] Lj.B. Ćirić, *Generalized contractions and fixed-point theorems*, *Publ. Inst. Math.*, **26**(1971), no. 12, 19-26.
- [5] L. Janos, *A converse of Banach's contraction theorem*, *Proc. Amer. Math. Soc.*, **18**(1967), no. 2, 287-289.
- [6] L. Janos, *On contraction type mappings*, *Math. Balkanica*, **1**(1971), 52-57.
- [7] I.A. Rus, *Bessaga mapping*, *Proc. Approx. Th.*, Cluj-Napoca, (1984), 164-172.
- [8] I.A., Rus, *Generalized Contractions and Applications*, Cluj Univ. Press, Cluj-Napoca, 2001.
- [9] I.A. Rus, *Some variants of contraction principle, generalizations and applications*, *Stud. Univ. Babeş-Bolyai Math.*, **61**(2016), no. 3, 343-358.
- [10] I.A. Rus, A. Petruşel, G. Petruşel, *Fixed Point Theory*, Cluj Univ. Press, Cluj-Napoca, 2008.
- [11] T. Zamfirescu, *Fixed point theorem in metric space*, *Arch. Math.*, **24**(1972), 292-298.

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