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Contractive type non-self mappings on metric spaces of hyperbolic type. (English)

Zbl 1089.54019

J. Math. Anal. Appl. 317, No. 1, 28-42 (2006).

A metric space (X, d) is said to be of hyperbolic type if all points $x, y \in X$ are endpoints of a metric segment (isometric image of a real segment), denoted by $\operatorname{seg}[x, y]$, such that for any $u, x, y \in X$ and $z \in \operatorname{seg}[x, y]$ satisfying $d(x, z) = \lambda d(x, y)$ for some $\lambda \in [0, 1]$ the following inequality $d(u, z) \leq (1 - \lambda)d(u, x) + \lambda d(u, y)$ holds. In this paper the author obtains several fixed point theorems for mappings $T : K \to X$ defined on a closed subset K of a complete metric space of hyperbolic type X that satisfy $T(\partial K) \subset K$ and various contraction-type conditions. Some examples are given to show that the obtained theorems are genuine generalizations of some known results from this area.

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MSC:

54H25 Fixed-point and coincidence theorems (topological aspects)

47H10 Fixed-point theorems

Keywords:

quasi-contraction mapping; weakly compatible mappings; stationary point

Full Text: DOI

References:

[1] Assad, N.A.; Kirk, W.A., Fixed-point theorems for set-valued mappings of contractive type, Pacific J. math., 43, 553-562, (1972) · Zbl 0239.54032

[2] Blumental, L.M., Theory and applications of distance geometry, (1953), Oxford Univ. Press

[3] Boyd, D.W.; Wong, J.S., On nonlinear contractions, Proc. amer. math. soc., 20, 458-464, (1969) · Zbl 0175.44903

[4] Camaro, J.L.C., An application of a fixed point theorem of D.W. Boyd and J.S.W. Wong, Rev. mat. estatist., 6, 25-29, (1988)

[5] Ćirić, L.B., A generalization of Banach's contraction principle, Proc. amer. math. soc., 45, 267-273, (1974) · Zbl 0291.54056

[6] Ćirić, L.B., A remark on rhoades fixed point theorem for non-self mappings, Int. J. math. math. sci., 16, 397-400, (1993) · Zbl 0820.47060

[7] Ćirić, L.B., Quasi-contraction non-self mappings on Banach spaces, Bull. acad. serbe sci. arts, 23, 25-31, (1998) · Zbl 1261.47070

[8] Ćirić, L.B.; Ume, J.S.; Khan, M.S.; Pathak, H.K.T., On some non-self mappings, Math. nachr., 251, 28-33, (2003) · Zbl 1024.47033

[9] Edelstein, M., On fixed and periodic points under contractive mappings, J. London math. soc., 37, 74-79, (1962) · Zbl 0113.16503

[10] Kirk, W.A., Krasnoselskii's iteration process in hyperbolic spaces, Numer. func. anal. optim., 4, 371-381, (1982) · Zbl 0505.47046

[11] Rakoch, E., A note on contractive mappings, Proc. amer. math. soc., 13, 459-645, (1962)

[12] Reich, S., Fixed-point of contractive functions, Boll. unione mat. ital., IV, 26-42, (1972) · Zbl 0249.54026

[13] Rhoades, B.E., Some applications of contractive type mappings, Math. sem. notes Kobe univ., 5, 137-139, (1977) · Zbl 0362.54044

[14] Rhoades, B.E., A fixed point theorem for some non-self mappings, Math. japon., 23, 457-459, (1978) · Zbl 0396.47038

[15] Takahashi, W., A convexity in metric spaces and non-expansive mappings I, Kodai math. sem. rep., 22, 142-149, (1970) · Zbl 0268.54048

[16] Wieczorek, A., Applications of fixed point theorems in game theory and mathematical economics, Wiadom. mat., 28, 25-34, (1988) · Zbl 0693.90100