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Caristi, Nadler and $\mathcal{H}^+$-Type Contractive Mappings and Their Fixed Points in θ-Metric Spaces

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Abstract: A new proper generalization of metric called as θ-metric is introduced by Khojasteh et al. (Mathematical Problems in Engineering (2013) Article ID 504609). In this paper, first we prove the Caristi type fixed point theorem in an alternative and comparatively new way in the context of θ-metric. We also investigate two θ-metrics on $\mathcal{CB}(X)$ (family of nonempty closed and bounded subsets of a set X). Furthermore, using the obtained θ-metrics on $\mathcal{CB}(X)$, we prove two new fixed point results for multi-functions which generalize the results of Nadler and Lim type in the context of such spaces. In order to illustrate the usability of our results, we equipped them with competent examples.

Keywords: θ-metric; θ-Hausdorff distance; multivalued mapping; fixed point