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COMMON FIXED POINTS VIA TRI-SIMULATION FUNCTION IN METRIC SPACES

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Abstract. Inspired by Gubran et al. [Italian Journal of Pure and Applied Mathematics - N 45, (2021)], we prove some common fixed point results using tri-simulation function in metric spaces by defining a new contractive condition. Several key findings from the literature are generalised by our findings, particularly, the ones contained in aforementioned article of Gubran et al. [Italian Journal of Pure and Applied Mathematics - N. 45, (2021)].

Keywords. simulation function, tri-simulation function, α-permisible mapping, fixed point, α-admissible mapping.

AMS (MOS) subject classification: 54H25, 47H10, 54E50.

1 Introduction

The Banach contraction principle, which states that every contraction map on a metric space admits a single fixed point, was developed by Polish mathematician Banach [9] in 1922. It is one of the most intuitive and practical theorem ever proven in analysis. Due to its simplicity and wide applicability, this fundamental result continues to motivate researchers in metric fixed point theory, and this idea has been developed and modified in many different ways (see [2] - [4], [6] - [8], [10], [13], [16], [17], [19], [20], [21], [23] and references therein).

Recently, Samet et al. [23] proposed a new contraction type self-mapping to combine various published results by auxiliary functions.

Definition 1.1 [23]: Let $\alpha : X \times X \to [0, \infty)$. A self-mapping $T : X \to X$ is called α-admissible if the condition

$$\alpha(x, y) \geq 1 \Rightarrow \alpha(Tx, Ty) \geq 1,$$

is satisfied for all $x, y \in X$.

Definition 1.2 [23]: Let T be a self-mapping defined on a metric space (X, d). Then, T is called an α-ψ contractive mapping if there exist two