Accepted Manuscript

Metric-like spaces to prove existence of solution for nonlinear quadratic integral equation and numerical method to solve it

Bipan Hazarika, Erdal Karapinar, Reza Arab, Mohsen Rabbani

PII: S0377-0427(17)30353-9
DOI: http://dx.doi.org/10.1016/j.cam.2017.07.012
Reference: CAM 11223

To appear in: *Journal of Computational and Applied Mathematics*

Received date : 16 April 2017

Please cite this article as: B. Hazarika, E. Karapinar, R. Arab, M. Rabbani, Metric-like spaces to prove existence of solution for nonlinear quadratic integral equation and numerical method to solve it, *Journal of Computational and Applied Mathematics* (2017), http://dx.doi.org/10.1016/j.cam.2017.07.012

Metric-like spaces to prove existence of solution for nonlinear quadratic integral equation and numerical method to solve it

Bipan Hazarika[a,*], Erdal Karapinar[b], Reza Arab[c] and Mohsen Rabbani[c]

[a]Department of Mathematics, Rajiv Gandhi University, Rono Hills, Doimukh 791 112, Arunachal Pradesh, India

[b]Department of Mathematics, Atilim University, Incek, Ankara, 06836, Turkey

[c]Department of Mathematics, Sari Branch, Islamic Azad University, Sari, Iran.

Email: bipan.hazarika@rgu.ac.in/bh_rgu@yahoo.co.in; erdalkarapinar@yahoo.com/ ekarapinar@atilim.edu.tr; mathreza.arab@iausari.ac.ir; mrabbani@iausari.ac.ir

Abstract. The purpose of this paper is to obtain some common fixed point results for two mappings satisfying various contractive conditions in metric-like spaces. These results extend some previous results in the literature, since the condition under which the operator admits common fixed points is more general than the others in literature. Therefore, several well known results are generalized. As an application we use these results to existence of solution for nonlinear quadratic integral equation. To credibility, we apply modified homotopy and Adomian decomposition method to find solution of the above problem with high accuracy.

Key Words: Common fixed point; coincidence point; metric-like spaces; homotopy; Adomian

AMS Subject Classification No: 34A34, 47H10, 54H25.

1. Introduction

Throughout this paper, unless otherwise specified, we always suppose that $\mathbb{N}^*$, $\mathbb{R}$ and $\mathbb{R}_0^+$ will denote the set of nonnegative integer numbers, the set of real numbers and the set of nonnegative real numbers, respectively and X is a non empty set. It is well known that the Banach contraction principle is one of the pivotal results of analysis. Generalizations of this principle have been obtained in several directions. The concept of metric spaces has been generalized in many directions. In 1992, Matthews [14] introduced the notion of a partial metric space which is a generalized metric space. Further, Matthews showed that the Banach contraction principle is valid in partial metric spaces and can be applied in program verification. In this space, the usual metric is replaced by partial metric with an interesting property that the self-distance of any point of space may not be zero. After that, fixed point results in partial metric spaces were studied by many other authors [3, 4, 5, 6, 7, 22]. Very recently, Hitzler and Seda [9] generalized the partial metric spaces by introducing dislocated space. Also, this notion was rediscovered by Amini-Harandi [1] and given the name of a metric-like space. The aim of this article is to make further studies on such problems, and to generalize and complement some known results. Matthews [14] introduced the concept of a partial metric space as follows.

Definition 1.1. [14] *A partial metric on a nonempty set X is a function $p : X \times X \longrightarrow \mathbb{R}_0^+$ such that for all $x, y, z \in X$:*

(p_1) $x = y \Leftrightarrow p(x, x) = p(x, y) = p(y, y)$,
(p_2) $p(x, x) \leq p(x, y)$,
(p_3) $p(x, y) = p(y, x)$,

August 4, 2017,
*The Corresponding author.