CONTROLLED RECTANGULAR METRIC-LIKE SPACES AND FIXED POINTS OF GRAPH PRESERVING MAPPINGS

SUSHANTA KUMAR MOHANTA[†] AND PRIYANKA BISWAS

Abstract. We introduce the concept of controlled rectangular metric-like spaces and analyze the existence of fixed points for graph preserving mappings in such spaces. As an application of our main result, we prove a coincidence point result which generalizes several recent results including fixed points of expansive mappings. We also illustrate our main result by presenting some nontrivial examples.

1. Introduction

Fixed point theory is an important branch of mathematics because of its applications in various fields of applied sciences. Banach contraction principle [4] in metric spaces plays a vital role in solving different existence and uniqueness problems in several fields of science and engineering. Many authors successfully generalized this remarkable theorem by modifying the contractive type condition or by weakening the underlying space(see [10, 11, 12, 14, 15, 18, 32, 34, 36, 37] and references therein). Among all these, Bakhtin [3] initiated the concept of b-metric spaces as a generalization of metric spaces and generalized the famous Banach contraction principle in such spaces. Later on, Kamran et al.[25] gave the idea of extended b-metric spaces as an extension of b-metric spaces. Very recently, Mlaiki et al.[27] introduced another new extension of b-metric spaces, called controlled metric type spaces. They also proved the corresponding Banach contraction principle and some other fixed point results in the setting of controlled metric type spaces(see [27, 28, 29, 30]).

The study of fixed point theory combining a graph is another new development in the domain of contractive type single-valued mappings. Starting from these considerations, the study of fixed points and coincidence points of mappings satisfying a certain