Poincare Journal of Analysis & Applications
Vol. 13, No. 1 (2026), 41-55

DOI: 10.46753/pjaa.2026.v013i01.003
Online Published on 08. 05. 2026

FIXED POINTS OF ENRICHED MULTIVALUED HARDY-ROGERS AND CIRIC TYPE CONTRACTIONS IN BANACH SPACES

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Date of Receiving : 17. 12. 2025
Date of Acceptance : 23. 03. 2026

Abstract. In this article, we introduce new classes of enriched multivalued Hardy-Rogers and Ciric-type contractions and establish fixed point results for such mappings in the setting of normed linear spaces. Our study also includes an analysis of the data dependence behavior of the fixed point set and the Ulam–Hyers stability of the fixed point formulation for these mappings. Illustrative examples are presented to demonstrate the applicability and effectiveness of the theoretical results. Several existing results in the literature are improved and generalized in this paper.

1. Introduction

The Banach Contraction Principle, a cornerstone of fixed point theory has been widely generalized and extended due to its applicability across various areas of applied mathematics and nonlinear analysis. In the literature, several generalizations of contraction maps have been presented, extending the classical contraction condition to broader domains by Kannan [14], Chatterjea [7], Reich [20], Ciric [8], Hardy-Rogers [11], Rhoades [21] and many others.

Berinde [5] initiated the analysis of fixed point results for non-contractive mappings in Banach spaces by utilizing the fixed point property of the average operator. His approach was based on the key idea that a mapping formed as a convex combination of a point and its image under a given mapping can be a contraction, even when the original mapping is not. Subsequent research in this area has been carried out by numerous authors, leading to the extension of classical contractive-type mappings to more generalized forms known as enriched contractive-type mappings [6].

2010 *Mathematics Subject Classification.* 47H10, 54H25.
Key words and phrases. Fixed Point, Enriched Contraction, Multivalued Mapping, Data Dependence, Stability.
Communicated by: Saeid Jafari
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