

## HILFER FRACTIONAL DIFFERENTIAL INCLUSIONS WITH NON INSTANTANEOUS IMPULSES IN BANACH SPACES

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**Abstract.** This article focuses on investigating the existence of solutions for a specific category of fractional differential inclusions with non-instantaneous impulses. These inclusions involve the Hilfer fractional derivative in Banach space. The outcomes derived from our research are established through the utilization of Darbo and Monch's fixed point theorems. Additionally, we employ set-valued analysis and the method of measures of non-compactness. The article concludes by providing an illustrative example to demonstrate the primary outcome of the study.

**Keywords.** Hilfer derivative, impulses, differential inclusions, multivalued jump, measure of noncompactness, Banach spaces, fixed point, fractional Calculus.

**AMS (MOS) subject classification:** 34A08, 26A33, 34K05.

## 1 Introduction

The field of fractional differential equations and inclusions stands as a pivotal domain, captivating the profound interest of both mathematicians and physicists. Over the past few decades, this field has undergone extensive scrutiny, as evidenced by the works of Benchohra *et al.* [1, 13, 14], Kilbas *et al.* [26], and Zhou [48], along with the encompassing references. This branch of knowledge has not only garnered scholarly attention but has also been instrumental in contemporary applied mathematical models. These models address tangible processes rooted in phenomena explored across various applied sciences [1, 43], as highlighted by Bainov and Simeonov [9], Lakshmikantham *et al.* [28], Samoilenko and Perestyuk [40], along with their associated references. Furthermore, several intriguing outcomes concerning specific categories of fractional differential equations have been investigated by numerous authors, with recent findings in the field of fractional differen-