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ON SOME REVERSES OF MINKOWSKI'S, HÖLDER'S AND HARDY'S TYPE INEQUALITIES USING ψ-FRACTIONAL INTEGRAL OPERATORS

Bhagwat R. Yewale and Deepak B. Pachpatte

Department of Mathematics,
Dr. B. A. M. University, Jaisingpura,
Aurangabad - 431004, Maharashtra, INDIA

E-mail : yewale.bhagwat@gmail.com, pachpatte@gmail.com

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Abstract: In present paper, we establish new reverses of Minkowski, Hölder and Hardy type inequalities by using ψ-Riemann-Liouville fractional integral operator.

Keywords and Phrases: Minkowski inequality, Hölder inequality, Hardy inequality, ψ-Riemann-Liouville fractional integral, fractional integral operator.

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1. Introduction

In 2006, Bougoffa [6] introduced the following reverse Minkowski integral inequality:

Let ζ and η be positive functions defined on [c, d]. Then

$$\left(\int_c^d \zeta^p(t)dt\right)^{\frac{1}{p}} + \left(\int_c^d \eta^p(t)dt\right)^{\frac{1}{p}} \leq K\left(\int_c^d \left(\zeta(t)+\eta(t)\right)^p dt\right)^{\frac{1}{p}}, \tag{1.1}$$

where $0 < l \leq \dfrac{\zeta(t)}{\eta(t)} \leq Ł$, for all t $\in$ [c, d] and $K = \dfrac{Ł(l+2)+1}{(l+1)(Ł+1)}$.

Inequalities play an important role in mathematical analysis due to its wide applications in various branches of Mathematics. In recent years, many researchers have generalized and improved the above inequality (1.1) in a number of ways. For