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BESSEL TYPE TRANSFORM AND RELATED RESULTS

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Abstract: In this paper we prove the estimates for the Bessel transform in the space $L_p^2(\mathbb{R}_+)$ on certain classes of functions by using a Bessel type generalized translation.

Keywords and Phrases: Bessel type operator, Bessel type transform, Bessel type generalized translation.

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1. Introduction and Preliminaries

Integral transforms play a vital role in diverse research area such as in engineering Mathematics and Mathematical physics. We prepare this paper by motivation of the work in [5]. Titchmarsh [8] characterized the set of functions $L^2(\mathbb{R})$ satisfying the Cauchy Lipschitz condition for the Fourier transform namely, we have

Theorem 1.1. *Let $\alpha \in (0,1)$ and assume that $f \in L^2(\mathbb{R})$. Then the following are equivalent:*

$$(i)\ \|f(x+h) - f(x)\|_{L^2(\mathbb{R})} = O(h^\alpha)\ as\ h \to 0$$

$$(ii) \int_{|\lambda|>r} |\mathfrak{F}(\lambda)|^2 d\lambda = O(r^{-2r})\ as\ r \to \infty,$$

where $\mathfrak{F}$ stands for the Fourier transform of f.