

Abstract

In this manuscript we study the action of the Laplace transform on rearrangement-invariant Banach function spaces. Our principal goal is to characterize the optimal range space corresponding to a given domain space within the category of rearrangement-invariant Banach function spaces. We first prove a key pointwise estimate of the non-increasing rearrangement of the image under the Laplace transform of a given function. Then we use this inequality to carry out the construction of the optimal range space. We apply this general result to establish an optimality relation between the Lebesgue and Lorentz spaces under the Laplace transform.