



Titchmarsh Theorem for the Two-Sided Quaternionic Dunkl Transform

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Abstract

This research investigates the two-sided quaternionic Dunkl transform of functions that satisfy specific Lipschitz conditions. In particular, we focus on Lipschitz functions belonging to the function space $L^2(\mathbb{R}^2, \mathbb{H})$ and study how these smoothness constraints influence the behavior of their quaternionic Dunkl transforms. Motivated by Theorems 84 and 85 of Titchmarsh, which characterize the transforms of Lipschitz functions on the real line, we extend these classical results to the quaternionic Dunkl framework, providing a natural generalization in the context of quaternion-valued functions and Dunkl-type analysis.

Keywords Quaternionic Dunkl transform · Lipschitz functions

Mathematics Subject Classification 43A62, 42B10, 42B37

1 Introduction

The classical Fourier transform (FT) has been extended to quaternionic analysis through the quaternionic Fourier transform (QFT), initially developed in a Ph.D. thesis and subsequently studied for applications in image processing and signal analysis.

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