

# On some Hardy-Littlewood type inequalities for weighted spaces in reduced quaternions

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In the theory of weighted spaces, differentiation and integration operations are an important tool for studying and characterization of the spaces. Hardy and Littlewood in 1920-30s found out the precise action of differentiation and integration in weighted Bergman spaces of holomorphic functions in the unit disc of the complex plane. Hardy and Littlewood were the first who considered the problem of harmonic conjugation in Bergman spaces on the unit disc. The problems of integro-differentiation and harmonic conjugates in the framework of quaternionic and Clifford analysis were already studied by several authors.

In this talk, we prove some Hardy-Littlewood inequalities in norms for monogenic Hardy, weighted Bergman and Dirichlet spaces of reduced quaternion-valued functions in the unit ball  $B_3 \subset \mathbb{R}^3$ . Instead of ordinary derivatives or gradient, we apply hypercomplex derivative for monogenic functions. Also, "harmonic conjugation" operator is bounded in weighted Dirichlet spaces of quaternion-valued functions in the ball  $B_3$ .