

The point wise behavior of 2-dimensional wavelet expansions in $L^p(\mathbb{R}^2)$

ABSTRACT

We show that the two dimensional wavelet expansion of $L^p(\mathbb{R}^2)$ function for $1 < p < \infty$ converges pointwise almost everywhere under wavelet projection operator. This convergence can be established by assuming some minimal regularity to get the rapidly decreasing for two dimensional wavelet $\psi_{j_1, j_2, k_1, k_2}$. The Kernel function of the wavelet projection operator in two dimension converges absolutely, distributionally and is bounded. Also the wavelet expansions in two dimension are controlled in a magnitude by the maximal function operator. All these conditions can be utilized to achieve the convergence almost everywhere.

Keyword: Two dimensional wavelet expansion; Kernel function; Almost everywhere convergence; Maximal function; Bounded