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8. Analysis

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The multidimensional Marcinkiewicz multiplier theorem for H^1 spaces on product domains

We show that the function ϕ is the Fourier multiplier on multiparameter H^1 space provided the suitable integral condition of Marcinkiewicz -Hörmander type holds for derivatives of ϕ of sufficiently large order. As a consequence we get that if the derivatives of ϕ of sufficiently large order (greater then in original Marcinkiewicz multidimensional multiplier theorem) satisfy the integral Marcinkiewicz condition then the norm of the multiplier transform $T_\phi : L^p(\mathbb{R}^d) \to L^p(\mathbb{R}^d)$ could be bounded by $C(p-1)^{-d}$ as p tends to 1.
In our proof only the classical (non-product) theory of H^p spaces and the Sobolev integral representation of functions by means of its derivatives are used.
An application to the rational multipliers arising in the theory of anisotropic Sobolev spaces is given.