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Aula B2 (UB).

Nonisotropic maximal operators and Hilbert transforms

NEAL BEZ

University of Birmingham (Birmingham, England)

ABSTRACT: We consider maximal functions $M_P f(x, \omega)$ and Hilbert transforms $H_P f(x, \omega)$ associated with the curves $\exp((\log t)P)\omega$, where P is a fixed matrix such that each eigenvalue has positive real part and ω is a unit vector. We will see how to prove sharp L^p to $L^p_x(L^q_\omega)$ mixed-norm estimates in all dimensions for these operators, for $p \in (1, \max(2, (d+1)/2)]$ for the maximal function, and for $p \in (1, 2]$ for the Hilbert transform. This extends work of Christ, Duoandikoetxea and Rubio de Francia who considered P equal to the identity matrix, in which case the averages are over straight line segments.

A key ingredient is a certain oscillatory integral estimate, and the larger range of exponents we obtain for the maximal function comes from an additional ingredient, which uses work of Gressman on L^p -improving of X -ray like transforms. Finally, we also describe some applications to curved Nikodym-type operators.