

Hilbert transform along $C^{1+\epsilon}$ vector field

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Abstract

Let v be a vector field from \mathbb{R}^2 to the unit circle \mathbb{S}^1 . We study the operator

$$H_v f(x) = p.v. \int_{-1}^1 f(x - tv(x)) \frac{dt}{t}.$$

We prove that if the vector field v has $1 + \epsilon$ derivatives, then H_v extends to a bounded map from L^2 into itself.