

On the product of an H^1 and a BMO function.

A famous theorem of Fefferman-Stein asserts that the dual of the Hardy space $H^1(\mathbb{R}^n)$ is the space $BMO(\mathbb{R}^n)$ of John and Nirenberg. But the duality is not given as in the L^p -case by the integral of the product. This product is indeed not integrable in general but belongs to some Orlicz space E .

If $f \in H^1(\mathbb{R}^n)$ and $b \in BMO(\mathbb{R}^n)$ one can give a meaning of $f.b$ as a distribution. The aim of this internship will be to prove that this distribution belongs to the Hardy-Orlicz space associated to E and to investigate whether the converse statement is true or not (this last result is not known if $n \geq 2$ and there is a partial (positive) answer if $n = 1$).

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References: E.M.Stein: Harmonic Analysis,

Bonami, Iwaniec, Jones, Zinsmeister: On the product of a function in H^1 and a function in BMO , Ann.

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This internship will take place in Orleans university.