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ON A COMPOSITION OPERATOR AND HARDY SPACE

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ABSTRACT. Characterizing a geometric property of the self map that induces a bounded composition operator on Blochs to a Hardy-Sobolov space, we give a way of constructing examples of Bloch functions f whose derivative is in H^p for all p : $0 < p < 1$ but $f \notin BMOA$. The hyperbolic version of such an example is also given.

1. Introduction.

Let $U = \{z : |z| < 1\}$ be the open unit disc of the complex plane and let T be the boundary of U identified with $[-\pi, \pi]$. Let $\sigma(z)$ denotes the hyperbolic distance of z and 0 in U:

$$\sigma(z) = \frac{1}{2} log \frac{1+|z|}{1-|z|}.$$

For $0 < p \leq \infty$ and for f subharmonic in U, we set

$$\|f\|_p = \sup_{0 \leq r < 1} M_p(r, f),$$

where

$$M_p(r, f) = \left(\int_0^{2\pi} |f(re^{i\theta})|^p \frac{d\theta}{2\pi} \right)^{\frac{1}{p}} \qquad \text{if } p < \infty$$

and

$$M_\infty(r, f) = \sup_\theta |f(re^{i\theta})|.$$

If $f(z)$ is subharmonic in U, then it has a harmonic majorant if and only if $\|f\|_1 < \infty$.

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