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On some bilinear problems on weighted Hardy-Sobolev spaces

Content :

If w is a weight in ${\bf S}^n$, the weighted Hardy-Sobolev space $H_s^p(w)$,

$0\leq s$, $0 \lt p \lt +\infty$, consists of functions f holomorphic in $\B^n$ such that if

${\displaystyle f(z)=\sum_k f_k(z)}$ is its homogeneous polynomial expansion, and

${\displaystyle (I+R)^s f(z):=\sum_k (1+k)^s f_k(z)},$ we have that

$${\displaystyle ||f||_{H_s^p(w)}^p:= \sup_{r\lt 1}\int_{{\bf S}^n}|(I+R)^s f(r\zeta)|^pw(\zeta)d\sigma(\zeta)<+\infty}.$$

For fixed $0 \lt s,t\lt n$, and w a weight in the Muckenhoupt class ${\mathcal A}_p$,

we study the positive Borel measures μ on the unit sphere of $\C^n$, ${\bf S}^n$,

for which the following bilinear problem holds: There exists $C>0$ such that for any $f\in H_s^2(w)$,

$g\in H_t^2(w)$,

\begin{equation*}

\sup_{\rho<1}\left|\int_{{\bf S}^n}f(\rho\zeta) \overline{g(\rho\zeta)}d\mu(\zeta)\right|\leq C\|f\|_{H_s^2(w)}\|g\|_{H_t^2(w)}.

\end{equation*}

We will give characterizations of this bilinear problem in two situations: for s,t non necessarily equal, under some restrictions on s,t and the

weight w, and when $s=t$ in a more general situation. (Joint work with
Joaqu\'\i n M.\ Ortega.)

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