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Aula T2 (UB).

A T_1 -type theorem for the Sobolev space of a domain

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ABSTRACT:

We undertake some problems involving the boundedness of the Beurling transform in Sobolev spaces on Lipschitz domains $W^{s,p}(\Omega)$. In [1], the case $s \leq 1$ was solved, finding a T_1 theorem. In [2] the authors gave a geometric characterization of the domain.

We consider the case $s = n \in \mathbb{N}$. Let Ω be a Lipschitz domain. If $p > 2$ the following assertions are equivalent:

- The Beurling transform is bounded in $W^{n,p}(\Omega)$
- For any given polynomial P restricted to the domain Ω with degree smaller or equal to n we have $BP \in W^{n,p}(\Omega)$.

Furthermore, if the vector normal to the boundary is in the Besov space $B_{p,p}^{n-1/p}(\partial\Omega)$, both conditions are achieved.

References

- [1] Cruz, V.; Mateu, J.; Orobitg, J. Beltrami equation with coefficient in Sobolev and Besov spaces. *Canad. J. Math* (2013), online edition.
- [2] Cruz V.; Tolsa, X. Smoothness of the Beurling transform in Lipschitz domains *J. Funct. Anal.* **262** (2012), Issue 10, 4423–4457.