

WEIGHTS AND APPLICATIONS

RICARDO G. DURÁN¹

ABSTRACT. Estimates in weighted norms is a classic topic in Harmonic Analysis since the pioneering works of Stein, Mackenhaupt and Wheeden. In particular, in [4], the author introduced the famous A_p class which gives a necessary and sufficient condition for the boundedness of the Hardy-Littlewood maximal function, as well as for the Riesz transforms, in a weighted norm.

Afterwards, estimates in weighted norms have been used in many applications in partial differential equations and in their numerical approximation by finite element methods. For example, in the important paper [2], the authors used the theory of weights for the analysis of degenerate elliptic equations.

In finite element methods weighted estimates are a classic tool for error estimates in L^∞ (see [1]) and for the analysis of problems with corner or edge singularities (see [3]).

More recently, many new applications have been considered both for variational analysis and for error estimates in finite element methods (a priori and a posteriori). In this talk we review some of these results. In particular we show how weighted estimates can be used for the variational analysis of fluid and elasticity equations on non-smooth domains.

REFERENCES

- [1] P. G. CIARLET, *The Finite Element Method for Elliptic Problems*, North-Holland, Amsterdam, 1978.
- [2] E. B. FABES, C.E. KENIG, AND R.P. SERAPIONI, *The local regularity of solutions of degenerate elliptic equations*, Comm. Partial Differential Equations 7(1) (1982), 77–116.
- [3] P. GRISVARD, *Elliptic Problems in Nonsmooth Domains*, Pitman, Boston, 1985.
- [4] B. MUCKENHOUP *Weighted norm inequalities for the Hardy maximal function*, Trans. Amer. Math. Soc. 165 (1972), 207–226.

¹ Supported by ANPCyT (grant PICT 2010-1675), by CONICET (grant PIP 1420090100230) and by Universidad de Buenos Aires (grant 20020090100067), e-mail: rduran@dm.uba.ar
Departamento de Matemática, FCEyN e IMAS, UBA-CONICET, Argentina.