

INDEX

A - L^p SPACES

Topological space

σ -algebra

Measurable set, space, function

Norm, scalar product

Banach space, Hilbert space

L^p spaces

Hölder's inequality

Minkowski's inequality

dual space of L^p

weak topology

separable spaces

B SOBOLEV SPACES

Notion of weak derivative

Def of Sobolev space

Sobolev spaces in dim. 1 : main results

The space $W_0^{1,p}(\Omega)$

The dual space of $W_0^{1,p}(\Omega)$

C SOBOLEV SPACES IN DIMENSION ≥ 2

Definition of $W^{1,p}$ and H^1

Examples of functions in $W^{1,p}$ that are not differentiable or continuous

Results of approximations

Definition of $W^{k,p}$

Sobolev inequalities (embeddings)

Compactness: Rellich-Kondrachov theorem

Boundary values: "0" at the boundary
traces
spaces H_0^1 and $W_0^{1,p}$

Poincaré inequality

The dual space of $W_0^{1,p}$

Traces for functions in $W_0^{1,p}$

D VARIATIONAL FORMULATION OF ...

Weak and classic solution for $-\Delta u = f$, $f \in L^2$

Some examples in $\text{dim } 1$

Hilbert spaces: some recalls (orthogonal projection)

Riesz-Frechet theorem

Lax-Milgram theorem

Application of Lax-Milgram to linear elliptic equations

Weak formulation both for Dirichlet and Neumann problems.

E - IDEA OF GALERKIN'S METHOD

F - REGULARITY RESULTS

A local and a global result of regularity
in H^k for solutions of an elliptic equation.

G - SOME PROPERTIES OF THE SOLUTIONS

The (weak) maximum principle

A historical introduction to regularity for
solutions of elliptic equations:

- the 19th Hilbert's problem
- (Hölder continuity \rightarrow) - the solution (by De Giorgi and Nash)
- local boundedness (by Moser)

The Harnack inequality

(and the proof of Hölder continuity by Moser)