DEPARTAMENTO DE
ANÁLISIS MATEMÁTICO

Instituto de Matemática Interdisciplinar

Posgrado en Investigación Matemática, Universidad Complutense de Madrid,
Mención de Calidad MEC (MDC 2006-00482)

Curso de doctorado

Jan Lang

UCM y Ohio State University (EEUU)

"Generalized Trigonometric Functions "

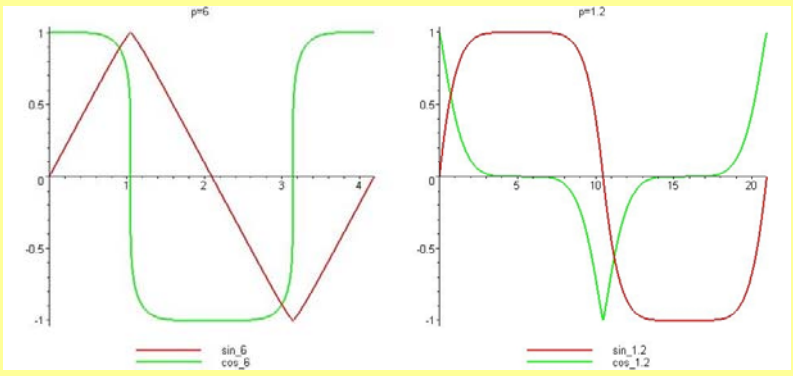

Figure 1: $\sin_6(x)$; $\cos_6(x)$ and $\sin_{1.2}(x)$; $\cos_{1.2}(x)$

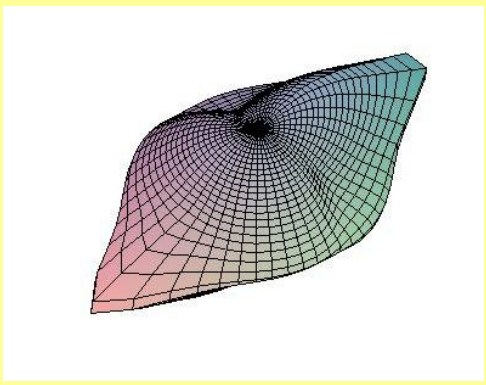

Figure 2: The unit ball of $W^{1,p}([0,1])$ in $L^p([0,1])$ space when p=10

It is a generally acknowledged fact that trigonometric functions are ones of the most important functions in mathematics. They represent eigenfunctions for Laplace operator, generate bases in function spaces, transfer coordinate systems, etc. Since their definition is linked with R^2 equipped with l^2 metric, it is natural to consider a definition of "generalized" trigonometric functions associated with the structure of l^p space.

The aim of this course is to study generalized trigonometric functions and explore their connections with different areas of analysis.

The first part of the course is devoted to introduction of generalized trigonometric functions ($\sin_p$; $\cos_p$; $\tan_p$) via hyperbolic integrals and then to showing some of their fundamental properties (Pythagorean identity, periodicity, etc).

The second part of the course is focused on connection of generalized trigonometric functions with the following topics:
- Geometry of l^p
- Voltera-type operators
- p-Laplacian
- Basis in L^p

The last part of the course will deal with Kolmogorov, Bernstein, Gel'fald and Approximation numbers for Sobolev embedding on interval. Exact values of these numbers and optimal approximation of Sobolev embedding will be obtained via subspaces and maps generated by generalized trigonometric functions when $1 < p < \infty$.

Organizado por el Departamento de Análisis Matemático de la UCM y el IMI.

Fecha:11a 17 de marzo de 2009. De 15:00 a 16:30 horas.

Seminario 222, Facultad de Ciencias Matemáticas, UCM.