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XI Encuentros de Análisis Real y Complejo

Chinchón, 7 al 10 de mayo de 2009

Posters

1. Autor: Renato Álvarez Nodarse (Universidad de Sevilla)

Título: *Relaciones de recurrencia "a la carta" para funciones hipergeométricas y sus aplicaciones en mecánica cuántica.*

Resumen: Mostraremos como usando el método de Nikiforov y Uvarov se pueden encontrar relaciones de recurrencia para las funciones hipergeométricas, tanto "continuas" como "discretas". A partir de muchas de ellas además se puede encontrar relaciones de recurrencia para las funciones de onda de los principales sistemas cuánticos.

2. Autores: J.J. Betancor, A. Chicco-Ruiz, J.C. Fariña y L. Rodríguez-Mesa (Universidad de La Laguna),

Título: Odd $BMO(\mathbb{R})$ functions and Carleson measures in the Bessel setting

Resumen: Sea BMO_+ el conjunto de las funciones localmente integrables en $[0, \infty)$ tales que su extensión impar a \mathbb{R} pertenece al espacio BMO clásico. Consideramos el operador de Bessel Δ_λ , $\lambda > 0$, dado por

$$\Delta_\lambda = -x^{-\lambda} \frac{d}{dx} x^{2\lambda} \frac{d}{dx} x^{-\lambda},$$

y los semigrupos del calor, $\mathcal{W}^\lambda = \{W_t^\lambda\}_{t>0}$, y de Poisson, $\mathcal{P}^\lambda = \{P_t^\lambda\}_{t>0}$, asociados a Δ_λ .

El resultado principal del trabajo establece una caracterización de BMO_+ a través de medidas de Carleson relativas a \mathcal{W} y a \mathcal{P} .

Además, el camino seguido para la prueba, contiene nuevas caracterizaciones de $H^1_\circ(\mathbb{R})$, la clase constituida por las funciones impares que pertenecen al espacio de Hardy $H^1(\mathbb{R})$. Este espacio se describe en términos de g -funciones de Littlewood-Paley no tangenciales asociadas al semigrupo de Poisson \mathcal{P} .

3. Autores: J.J. Betancor, A. Chicco-Ruiz, J.C. Fariña y L. Rodríguez-Mesa (Universidad de La Laguna),

Título: Maximal operators, Riesz transforms and Littlewood-Paley functions associated with Bessel operators on BMO

Resumen: Sea BMO_+ el espacio de las funciones localmente integrables en $[0, \infty)$ tales que su extensión impar a \mathbb{R} pertenece al espacio BMO clásico. Consideramos el operador de Bessel Δ_λ , $\lambda > 0$, dado por

$$\Delta_\lambda = -x^{-\lambda} \frac{d}{dx} x^{2\lambda} \frac{d}{dx} x^{-\lambda},$$

y los semigrupos del calor, $\mathcal{W}^\lambda = \{W_t^\lambda\}_{t>0}$, y de Poisson, $\mathcal{P}^\lambda = \{P_t^\lambda\}_{t>0}$, asociados a Δ_λ .

En este trabajo se analiza el comportamiento sobre BMO_+ de algunos operadores propios del análisis armónico. Concretamente del operador maximal de Hardy-Littlewood en $(0, \infty)$, y de los operadores maximales, g -funciones de Littlewood-Paley y transformadas de Riesz asociados a los semigrupos \mathcal{W}^λ y \mathcal{P}^λ . Se establece que son operadores acotados de BMO_+ en si mismo. En la prueba es fundamental cierta relación puntual entre el núcleo del calor (resp., Poisson) correspondiente al semigrupo \mathcal{W}^λ (resp., \mathcal{P}^λ) y el núcleo del calor (resp., Poisson) clásico.

4. Autores: Joan Cerdà (Universitat de Barcelona), Joaquim Martín (Universitat Autònoma de Barcelona) y Pilar Silvestre (Universitat de Barcelona)

Título: *Capacitary function spaces*

Resumen: These notes contain a part of some work in progress concerning a general construction of function spaces on a capacity space (Ω, Σ, C) , similar to Banach function lattices on a measure space (Ω, Σ, μ) . They are adapted to strong and weak capacitary inequalities, and to extend to Banach function lattices some aspects of the rearrangement invariant spaces.

5. Autores: Fernando Lledó (Universidad Carlos III de Madrid y RWTH-Aachen University, Alemania) y Olaf Post (Humboldt University Berlin, Alemania)

Título: *Eigenvalue bracketing for discrete and metric graphs*

Resumen: We develop eigenvalue estimates for the Laplacians on discrete and metric graphs using different types of boundary conditions at the vertices of the metric graph. Via an explicit correspondence of the equilateral metric and discrete graph spectrum (also in the “exceptional” values of the metric graph corresponding to the Dirichlet spectrum) we carry over these estimates from the metric graph Laplacian to the discrete case. We apply the results to covering graphs and present examples where the covering graph Laplacians have spectral gaps. [Journal of Mathematical Analysis and Applications 348 (2008) 806-833.]

6. Autor: Fernando Lledó (Universidad Carlos III de Madrid y RWTH-Aachen University, Alemania)

Título: Modular Theory by example

Resumen: The present poster contains a short introduction to Modular Theory for von Neumann algebras with a cyclic and separating vector. It includes the formulation of the central result in this area, the Tomita-Takesaki theorem, and several of its consequences. We illustrate this theory through several elementary examples. We also present more elaborate examples and compute modular objects for a discrete crossed product and for the algebra of canonical anticommutation relations (CAR-algebra) in a Fock representation. [Subm. to Contemporary Mathematics, AMS]

7. **Autores:** Guillermo López Lagomasino, Domingo Pestana, José M. Rodríguez (Universidad Carlos III de Madrid) y Dmitry Yakubovich (Universidad Autónoma de Madrid)

Título: Computation of conformal representations of compact Riemann surfaces

Resumen: We find a system of two polynomial equations in two unknowns, whose solution allows to give an explicit expression of the conformal representation of a simply connected three sheeted compact Riemann surface onto the extended complex plane. This function appears in the description of the ratio asymptotic of multiple orthogonal polynomials with respect to so called Nikishin systems of two measures.

8. **Autores:** Ana Portilla (St. Louis University, Madrid Campus) y Eva Tourís (Universidad Carlos III de Madrid)

Título: A Characterization of Gromov hyperbolicity of surfaces with variable negative curvature

Resumen: In this paper we show that, in order to check Gromov hyperbolicity of any surface with curvature $K \leq -k^2 < 0$, we just need to verify the Rips condition on a very small class of triangles, namely, those contained in simple closed geodesics. This result is, in fact, a new characterization of Gromov hyperbolicity for this kind of surfaces.

9. **Autores:** Ana Portilla (St. Louis University, Madrid Campus), José M. Rodríguez y Eva Tourís (Universidad Carlos III de Madrid)

Título: The multiplication operator, zero location and asymptotic for non-diagonal Sobolev norms

Abstract: In this paper we are going to study the zero location and asymptotic behavior of extremal polynomials with respect to a generalized non-diagonal Sobolev norm in which the product of the function and its derivative appears. The orthogonal polynomials with respect to this Sobolev norm are a particular case of those extremal polynomials. The multiplication operator by the independent variable is the main tool in order to obtain our results.

10. **Autores:** Yamilet Quintana, (Universidad Simón Bolívar, Venezuela) Héctor Pijeira y José M. Rodríguez (Universidad Carlos III de Madrid)

Título: Sobolev formal orthogonality on algebraic curves and extensions of Favard theorem

Resumen: In this work Sobolev formal orthogonality on harmonic algebraic curves ($\Im h(z) = 0, h(z) \in C[z]$), and equipotential curves ($|h(z)| = 1, h(z) \in C[z]$) is defined and studied. In each case, such study is done through the characterization of bilinear forms whose associated functional vanishes the multiples of $(h(z) - \overline{h(z)})^{2n+1}$, for harmonic algebraic curves, or the characterization of bilinear forms whose associated functional vanishes the multiples of $(h(z)\overline{h(z)} - 1)^{2n+1}, n \in \mathbb{N}$. Such characterizations allow us present new extensions of Favard theorem in this setting.

11. Autor: Yamilet Quintana, (Universidad Simón Bolívar, Venezuela)

Título: On Hilbert extensions of Weierstrass' theorem with weights

Resumen: In this work we study the set of \mathcal{G} -valued functions which can be approximated by \mathcal{G} -valued continuous functions in the norm $L_{\mathcal{G}}^{\infty}(I, w)$, where I is a compact interval, \mathcal{G} is a real and separable Hilbert space and w is certain \mathcal{G} -valued weakly measurable weight. Thus, we obtain a new extension of celebrated Weierstrass approximation theorem.

12. Autor: Elena Romera (Universidad Carlos III de Madrid)

Título: Extremal vector valued inequalities for Hankel transforms

Resumen: The disc multiplier may be seen as a vector valued operator when we consider its projections in terms of the spherical harmonics. In this form, it represents a vector valued Hankel Transform. We know that, for radial functions, it is bounded on the spaces $L_{lq}^p(r^{n-1}dr)$ when $\frac{2n}{n+1} < p, q < \frac{2n}{n-1}$. Here we prove that there exist weak-type estimates for this operator for the extremal exponents, that is, it is bounded from $L_{lq}^{p_i, 1}(r^{n-1}dr)$ to $L_{lq}^{p_i, \infty}(r^{n-1}dr)$ for $i = 0, 1$ when $p_0 = \frac{2n}{n+1}, p_1 = \frac{2n}{n-1}, p_0 < q < p_1$ and we consider radial functions.