Curriculum Vitae

Personal Informations

Marouane RABAOUI

Male, born in Tunis, Tunisia.
Tunisian citizen
Date of Birth : 30 April 1980
Marital status : Married, two children

Professional address : King Faisal University
Department of Mathematics
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Actual position

Assistant Professor at King Faisal University
Ministry of Higher Education, King Faisal University
Department of Mathematics, Al-Hassa
Saudi Arabia.

Preceding positions

2008-2013	**Research-Professor at the University of Carthage** Department of Mathematics at the Preparatory Institute for Engineering Studies of Nabeul Holds the rank of Assistant Professor. Member of the Laboratory of Mathematical Analysis and Applications at the Faculty of Sciences of Tunis.
2007-2008	**ATER (instructor)** University of Pierre and Marie-Curie (Paris 6 University), Department of Mathematics.
2004-2007	**Allocataire de recherche (Research grant from the French Ministry of Education, Higher Education and Research)** Paul Verlaine University - Metz

Education

June 2012	**Scientific Research stay** CMCU Project University of Pierre and Marie-Curie (Paris 6 University) Department of Mathematics
February-March 2008	**Scientific Research stay** CMCU Project Faculty of Sciences of Tunis Department of Mathematics
2004-2007	**PhD in Pure Mathematics** Paul Verlaine University - Metz Laboratoire de mathématiques et applications de Metz (LMAM) and Institut de Mathématiques de Jussieu, University of Pierre and Marie-Curie (Paris 6 University) **Thesis :** Analyse harmonique en dimension infinie, paires de Guelfand généralisées Date and place of thesis defense : 30 november 2007, LMAM - Metz **Thesis Jury :** Pr. MUSTAPHA Sami (President), Pr. LUDWIG Jean (Examinators) Pr. OLSHANSKI Grigori et Pr. HILGERT Joachim (Reviewers) Pr. FARAUT Jacques et Pr. PASQUALE Angela (Advisors)
2003-2004	**DEA (Master's Degree in research) in Pure Mathematics : Analyse et Géométrie** Paris 6 University Mention Bien (magna cum laude)
2002-2003	**Maîtrise de Mathématiques Pures (Master and Bachelor's Degree in Pure Mathematics)** Faculty of sciences of Tunis Mention Bien (magna cum laude)- Presidential distinction
2000-2001	**Diplôme universitaire d'études scientifiques (Two-year University degree in sciences)** Faculty of sciences of Tunis Mention Trés Bien (summa cum laude - Ranked : First)

Research grants and Prizes

2003	**President's Prize** President's Prize for Outstanding Achievement in University Education Tunisia
2003-2004	**Grant for the Master Degree** Research grant from the Tunisian Ministry of Higher Education, Research and Technology Tunisia
2004-2007	**Grant for the Ph.D. Degree** Research grant from the French Ministry of Education, Higher Education and Research Paul Verlaine University - Metz

Teaching

Since September 2013	**Assistant Professor** Ministry of Higher Education, King Faisal University, Department of Mathematics, Al-Hassa, Saudi Arabia. Teached courses : General Mathematics, Principles of Algebra, Linear Algebra, Transformational Geometry, Calculus 2, Calculus 3, Partial Differential Equations, Functional Analysis, Ordinary Differential Equations (Master's Degree), Integral Transforms (Master's Degree), Principles of Analysis, Complex Analysis, Topology, Foundation of Geometrie.
2008-2013	**Research-Professor** University of Carthage Research-Professor at the Department of Mathematics in the Preparatory Institute for Engineering Studies of Nabeul Holds the rank of Assistant Professor
February-March 2008	**Teaching activities within a scientific stay** Faculty of sciences of Tunis Tutorials in Random Matrices (4 hrs) First year of the Master's Degree of Harmonic Analysis
February 2008	**Qualifié aux fonctions de maître de conférences (Qualified for the position of Associate Professor)** Section 25 of CNU : Mathematics N° of qualification : 08225191971 Date : 06/02/2008
2007-2008	**ATER(instructor)** Paris 6 University Tutorials in graduate Analysis (96 hrs)
2005-2006	**Assistant in mathematics** Paris 12 University - Val de Marne Tutorials in graduate Algebra (33 hrs)
2004-2005	**Assistant in mathematics** Paris 12 University - Val de Marne Tutorials in graduate Analysis (42 hrs)
2003-2004	**Assistant in mathematics** Paris 12 University - Val de Marne Tutorials in graduate Algebra (39 hrs)

Research field

Since the work of Wigner in the years 1950, the analysis of Random Matrices is one of the central subjects of the mathematical physics. It consists in studying the statistics of the eigenvalues of very large matrices. The mathematical tools used are for the majority derived from traditional analysis, but seen from a completely new point of view. There are essentially two approaches to these problems. The most traditional consists in considering initially the problem with fixed dimension, then to study the asymptotic one when dimension tends towards infinity. A second approach consists in being placed from the beginning in infinite dimension, the analysis of the Random Matrices is interpreted then within the framework of the infinite dimensional Harmonic Analysis. This second approach is well represented in the work of G Olshanski, A. Vershik, D. Voiculescu.

Our research topic is within the framework of this second approach. More precisely one proposes to exploit the non-commutative harmonic analysis, in particular the analysis of symmetric spaces, to study the spaces of infinite dimensional matrices under the action of infinite dimensional groups.

Summary of the Thesis

We first prove a generalisation of Bochner theorem. This result deals with Olshanski spherical pairs (G_∞, K_∞) which are defined as inductive limits of increasing sequences of Gelfand pairs $(G_n, K_n)_n$. By using Choquet's theorem, we establish a Bochner type representation of any element φ in the set $\mathcal{P}^\natural(G_\infty)$ of K_∞-biinvariant continuous functions of positive type on G_∞. Such representation is given via a unique, positive and bounded measure μ by : $\varphi(g) = \int_\Omega \omega(g)\ d\omega$. Here Ω is the set of spherical functions of positive type on G_∞.

Then we consider the spherical pair $(U(\infty) \times U(\infty),\ (U(\infty) \times U(\infty)) \ltimes V_\infty)$ where $V_\infty = M(\infty, \mathbb{C})$ is the infinite dimensional space of square complex matrices with only finite non zero coefficients, and $U(\infty)$ is the infinite dimensional unitary group. By using a result of G. Olshanski and A. Vershik, we determine the set Ω of spherical functions of positive type for the considered spherical pair. This enables us to find a parameterized version of the generalized Bochner theorem which we use to establish an integral representation of continuous functions of negative type in this case.

Keywords : Gelfand Pair, Bochner-Godement theorem, function of positive type, function of negative type, spherical function, spherical pair, inductive limit, generalized Bochner theorem.

Publications

1. **A Bochner Type Theorem for Inductive Limits of Gelfand Pairs**
   Annales de l'institut Fourier, 58 no. 5 (2008), p. 1551-1573

2. **Asymptotic Harmonic Analysis on the Space of Square Complex Matrices**
   Journal of Lie Theory 18 (2008), No. 3, 645–670

3. **A Lévy-Khintchine formula for the space of infinite dimensional square complex matrices.**
   Bull. Sci.math. 139 (2015) 283-300

4. **Functions of negative type on the Olshanski spherical pair** $(SL(\infty); SU(\infty))$**.**
   Journal of Lie Theory 27 (2017), No. 1, 237–250

5. **Vanishing of the** 1**-Cohomology on Olshanski Spherical pairs.** Preprint (2017).

Supervision and thesis jury

2014 **Reviewer and member of Jury**
Designed as a reviewer and a jury member of the master's degree thesis of Reem Fahad Al Subaie entitled : *Transmutation operators associated with a Bessel type operator on* $]0, \infty[$ *and certain applications.*
University of Dammam, Department of Mathematics,
Saudia Arabia

Selection of invited talks and attended conferences

2004-2005	**Participation in the Workshop of the International Research Training Group** Paderborn-Germany
2005-2006	**Participation in the Workshop of the International Research Training Group** Metz-France, with the talk :" Is there a Bochner type theorem for Olshanski's spherical pairs ?"
2005-2006	**Participation in the 14th collocium of the Tunisian Society of Mathematics (SMT)** Hammamet-Tunisia
2006-2007	**Participation in the International Conference on Harmonic Analysis and Applications** Sousse-Tunisia, with the talk : "Une généralisation du théorème de Bochner"
2006-2007	**Participation in the 15th collocium of the Tunisian Society of Mathematics (SMT)** Sousse-Tunisia
2006-2007	**Invitation to the Metz-Nancy-Reims-Strasbourg days in 2007** Nancy-France. Participation with the talk : "A Bochner Type Theorem for Inductive Limits of Gelfand Pairs"
2007-2008	**Invitation to a scientific stay at the faculty of sciences of Tunis** Participation with the talk : "Un théorème de type Bochner pour les paires sphériques d'Olshanski et applications"
2011-2012	**Invitation to a scientific stay at University of Pierre and Marie-Curie (Paris 6 University)**
2012-2013	**Participation in the 12th International Symposium of Orthogonal Polynomials, Special Functions and Applications** Sousse-Tunisia

Miscellaneous

Languages : Arab (native language), French (fluently written and read and spoken), English (fluently written and read)

Technical skills : Windows, Linux, Latex, Emacs, Maple, Matlab, Adobe and the softwares of Windows.

Referees

1. **Professor Jacques Faraut**
   Equipe d'analyse algébrique
   Institut de Mathématiques de Jussieu
   175, Rue Chevaleret
   75013 Paris, France
   E-mail : faraut@math.jussieu.fr

2. **Professor Angela Pasquale**
   Laboratoire de Mathématiques et Applications de Metz
   UMR 7122, Université de Metz et CNRS
   Bâtiment A, Ile de Saulcy
   57045 Metz Cedex 01, France
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3. **Professor Sifi Mohamed**
   Laboratoire d'Analyse Mathématiques et Applications
   Faculté des sciences de Tunis
   Campus Universitaire El Manar
   2092 Tunis Tunisie
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4. **Professor Sami Mustapha**
   Equipe d'analyse algébrique
   Institut de Mathématiques de Jussieu
   175, Rue Chevaleret
   75013 Paris, France
   E-mail : sam@math.jussieu.fr