NEW DOCTORAL DEGREES

IN THE DEPARTMENT OF MATHEMATICS UNIVERSITY OF OSIJEK

Dr. Ivan Matić received his PhD in Mathematics from the Department of Mathematics of the University of Zagreb on 4 February 2010 with the dissertation entitled "Unitary duals of p-adic groups $SO(5)$ and $Mp(2)$" (Mentors: Dr. G. Muić and Dr. M. Hanzer).

Abstract

The problem of the determination of the unitary dual of a reductive algebraic group is one of the most important problems in representation theory, with numerous applications in harmonic analysis and the theory of automorphic forms. In this thesis, we classify the unitary duals of some low-rank reductive p-adic groups.

In the initial chapter, we systematically present the classification of the unitary dual of the group $SO(5, F)$ (modulo cuspidal representations), where F is a local non-archimedean field. We use the method of Jacquet modules and intertwining operator methods.

In the next chapter, we determine non-cuspidal part of the unitary dual of the non-linear metaplectic group $Mp(2)$, an unique nontrivial two-fold cover of the group $Sp(2)$ over a local non-archimedean field of characteristic different than two. We rely on the new results of authors Marcela Hanzer and Goran Muić, where they have related reducibilities of the representations of metaplectic groups with those of the special odd orthogonal groups, using theta correspondence. Besides that, those results allow us to use the method of Jacquet modules in investigating the composition series of the representations of the metaplectic group. In cases when this powerful methods happen to be insufficient tool, we use the theory of theta correspondence for dual pairs $Mp(n) \times O(2r + 1)$.

Generalizing some of the results obtained while determining the unitary dual of the group $Mp(2)$, in the following chapter we prove irreducibility of the unitary principal series for $Mp(n)$.

Let $Spin(2n + 1)$ denote the simply-connected algebraic group of the type B_n, which can also be obtained as a two-fold cover of the classical group $SO(2n+1)$ if we are working over an algebraically closed field. In the representation theory, it is very important to know what the Levi subgroups in considered group look like, especially when investigating the parabolically induced representations. As a contribution to the study of this problem, in the final chapter we give a precise description of Levi subgroups of the group $Spin(2n + 1)$ over algebraic closure of a p-adic field.

Published papers

[1] **I. Matić**, *The Unitary dual of p-adic $SO(5)$*, Proc. Amer. Math. Soc. **138**(2010), 759–767.

[2] **I. Matić**, *Composition series of the induced representations of $SO(5)$ using intertwining operators*, Glasnik Mat., accepted for publication.

[3] **I. Matić**, *Levi subgroups of p-adic $Spin(2n+1)$*, Math. Commun. **14**(2009), 223–233.

[4] M. Hanzer, **I. Matić**, *The unitary dual of p-adic $\widetilde{Sp(2)}$*, Pacific J. Math., accepted for publication.

[5] M. Hanzer, **I. Matić**, *Irreducibility of the unitary principal series of p-adic $\widetilde{Sp(n)}$*, Manuscripta Math., accepted for publication.