Lie Group and Representation Theory Seminar, Kyoto 2006

Date:	September 1 (Fri), 2006, 11:00–12:00
Place:	RIMS, Kyoto University : Room 402
Speaker:	菊地 克彦氏 (Katsuhiko Kikuchi)(Kyoto University)
Title:	Invariant polynomials and invariant differential operators for multiplicity-free actions of rank 3

Abstract: Let V be a finite-dimensional vector space over $\mathbb{C}$, and K a compact Lie group acting on V linearly. We call (K, V) a *multiplicity-free action* if each irreducible component appears at most one in the (holomorphic) polynomial ring $\mathcal{P}(V)$ on V. If (K, V) is multiplicity-free, then there exists a number r such that the ring $\mathcal{P}(V_{\mathbb{R}})^K = \mathcal{P}(V) \otimes \overline{\mathcal{P}(V)}$ of K-invariant polynomials on the underlying real vector space $V_{\mathbb{R}}$ of V is isomorphic to the polynomial ring of r variables. The number r is called the *rank* of (K, V).

For each highest weight λ which appears in the irreducible decomposition of $\mathcal{P}(V)$ there exist, up to a scalar, a unique K-invariant polynomial $p_\lambda(z, \overline{z})$ and a unique K-invariant differential operator $p_\lambda(z, \partial)$. In this talk, we describe all K-invariant polynomials $\{p_\lambda(z, \overline{z})\}$ and K-invariant differential operators $\{p_\lambda(z, \partial)\}$ for a rank 3 multiplicity-free action (K, V) which is not derived from a Hermitian symmetric space. Moreover, we give two 'symmetric' slices for visibility of the action (K, V). We show that the action of the stabilizer of one indicates the symmetry of the K-invariant polynomials, and that of the other indicates the symmetry of the eigenvalues of the K-invariant differential operators.

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