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on

$$Cl \text{ Span}\{\phi_{\lambda + \frac{1}{2}}, \phi_{\lambda + 3/2}, \dots\}$$

and

$$Cl \text{ Span}\{\dots, \phi_{-\lambda - 3/2}, \phi_{-\lambda - \frac{1}{2}}\},$$

respectively, with respect to the inner product

$$\langle \phi_m, \phi_n \rangle := \frac{(|m| - (\lambda + \frac{1}{2}))!}{(2\lambda + 1)_{|m| - (\lambda + \frac{1}{2})}} \delta_{m,n} \text{ (discrete series).}$$

4) $\pi_{0, \frac{1}{2}}^0$ (identity representation).

6.3. NOTES

6.3.1. Following BARGMANN [2], most authors prove Theorem 6.2 by infinitesimal methods. VILENKIN [43, Ch. VI] uses the method of the present paper. TAKAHASHI [39, §6] decides about unitarizability by considering whether $\pi_{\xi, \lambda, n, n}$ is a positive definite function on G .

6.3.2. A method related to this section was used in FLENSTED-JENSEN & KOORNWINDER [15] in order to find all irreducible unitary spherical representations of non-compact semisimple Lie groups G of rank one. They examined the nonnegativity of the coefficients in the addition formula for the spherical functions on G . See also [27, §6.4].

6.3.3. A generalization of Theorem 6.1 can be formulated for not necessarily abelian K and, partly, for K -finite τ , cf. [27, Theorems 6.4, 6.5].