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Borel-de Siebenthal Discrete Series and Associated Holomorphic Discrete Series

Let G_0 be a simply connected non-compact real simple Lie group with maximal compact subgroup K_0. Assume that $\mathrm{rank}(G_0) = \mathrm{rank}(K_0)$ so that G_0 has discrete series representations. If G_0/K_0 is Hermitian symmetric, one has a relatively simple discrete series of G_0, namely the holomorphic discrete series of G_0. Now assume that G_0/K_0 is not a Hermitian symmetric space. In this case, one has the class of Borel-de Siebenthal discrete series of G_0 defined in a manner analogous to the holomorphic discrete series. We consider a certain circle subgroup of K_0 whose centralizer L_0 is such that K_0/L_0 is an irreducible compact Hermitian symmetric space. Let K_0^* be the dual of K_0 with respect to L_0. Then K_0^*/L_0 is an irreducible non-compact Hermitian symmetric space dual to K_0/L_0. In this article, to each Borel-de Siebenthal discrete series of G_0, we will associate a holomorphic discrete series of K_0^*. Then we show the occurrence of infinitely many common L_0-types between these two discrete series under certain conditions.

Keywords: Discrete series, admissibility, relative invariants, branching rule, LS-paths.

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