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About the Relation between Multiplicity Free and Strong Multiplicity Free

Let G be a unimodular Lie group with finitely many connected components and let H be a closed unimodular subgroup of G. Let π be an irreducible unitary representation of G on $\mathcal{H}$ and τ one of H on V. Denote by $\mathrm{Hom}_H(\mathcal{H}_\infty, V)$ the vector space of continuous linear mappings $\mathcal{H}_\infty \to V$ that commute with the H-actions. Set $\mathrm{m}(\pi, \tau) = \dim \mathrm{Hom}_H(\mathcal{H}_\infty, V)$. The pair (G, H) is called a multiplicity free pair if $\mathrm{m}(\pi, \tau) \leq 1$ for all π and τ. We show: if every π has a distribution character, then (G, H) is a multiplicity free pair if and only if $(G \times H, \mathrm{diag}(H \times H))$ is a generalized Gelfand pair.

Keywords: Gelfand pair, multiplicity free, strong multiplicity free.

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