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Representations Associated to Small Nilpotent Orbits for Real Spin Groups

The results in this paper provide a comparison between the K-structure of unipotent representations and regular sections of bundles on nilpotent orbits. Precisely, let $\widetilde{G_0} = \widetilde{Spin}(a,b)$ with $a+b=2n$, the nonlinear double cover of $Spin(a,b)$, and let $\widetilde{K} = Spin(a,\mathbb{C}) \times Spin(b,\mathbb{C})$ be the complexification of the maximal compact subgroup of $\widetilde{G_0}$. We consider the nilpotent orbit $\mathcal{O}_c$ parametrized by $[3\ 2^{2k}\ 1^{2n-4k-3}]$ with $k>0$. We provide a list of unipotent representations that are genuine, and prove that the list is complete using the coherent continuation representation. Separately we compute $\widetilde{K}$-spectra of the regular functions on certain real forms $\mathcal{O}$ of $\mathcal{O}_c$ transforming according to appropriate characters ψ under $C_{\widetilde{K}}(\mathcal{O})$, and then match them with the $\widetilde{K}$-types of the genuine unipotent representations. The results provide instances for the orbit philosophy.

Keywords: Spin groups, nilpotent orbits, unipotent representations.

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