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Cubic Dirac Cohomology for Generalized Enright-Varadarajan Modules

For a complex semisimple Lie algebra $\mathfrak{g} = \mathfrak{h} \oplus \mathfrak{v}$ where $\mathfrak{h}$ is a quadratic subalgebra and $\mathfrak{h}$ and $\mathfrak{v}$ are orthogonal with respect to the Killing form, we construct a large family of $(\mathfrak{g}, \mathfrak{h})$ -modules with non-zero cubic Dirac cohomology. Our method uses analogue of the construction of generalized Enright-Varadarajan modules for what we call $(\mathfrak{h}, \mathfrak{v})$ -split parabolic subalgebras. This family of modules includes discrete series representations and $\mathcal{A}_q(\lambda)$ -modules.

Keywords: Quadratic subalgebra, generalized Enright-Varadarajan module, $(\mathfrak{g}, \mathfrak{h})$ -module, Verma modules, Kostant's cubic Dirac operator, Dirac cohomology.

MSC: 22E46, 22E47; 17B10