Homomorphisms of Semi-Holonomic Verma Modules : An Exceptional Case

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Abstract

Verma modules play an important part in the theory of invariant operators on homogeneous spaces. If G is a semisimple Lie group and P a parabolic subgroup of G, then there is often a differential geometry for which the homogeneous space G/P represents the flat model. An example is conformal geometry, where G is the special orthogonal group $\mathrm{SO}(n, \mathbb{C})$. A Verma module homomorphism will corresponds to an invariant operator on the flat space. The obvious question is: how can we generalize these operators to cases where there is curvature?

In this thesis we will look at a variation of Verma modules called *semi-holonomic* Verma modules, introduced by Eastwood and Slovák. They have studied the conformal case in detail, but here we will investigate instead the exceptional case of $G = E_6$. We will investigate when a Verma module homomorphism lifts to a semi-holonomic Verma module homomorphism. When this happens, we can deduce that there is a curved analogue of the corresponding invariant operator.