Abstract

In this talk we present a new explicit representation of the exceptional Lie algebra E_6 on the polynomial algebra in 36 variables. By applying a functor that lifts the full conformal oscillator representation of D_5 to that of E_6, we obtain all root vectors as explicit inhomogeneous first-order differential operators. This representation realizes every finite-dimensional irreducible module of arbitrary dominant integral highest weight, and its restricted dual module is naturally isomorphic to the Verma module. Moreover, all the D_5-singular vectors are determined explicitly by solving a certain system of partial differential equations. As an application, we focus on the finite-dimensional irreducible modules of highest weights $k\,\omega_1$+$l\,\omega_6$. By working out all D_5-singular vectors in these modules, we derive their branching rules with respect to the D_5-subalgebra.