

Quasiconformal realizations of $E_{6(6)}$, $E_{7(7)}$, $E_{8(8)}$ and $SO(n + 3, m + 3)$, $N \geq 4$ supergravity and spherical vectors

Murat Günaydin¹ and Oleksandr Pavlyk²

¹Institute for Gravitation and the Cosmos, Physics Department, Penn
State University, University Park, PA 16802, USA

murat@phys.psu.edu

²Wolfram Research Inc., 100 Trade Center Dr., Champaign, IL 61820, USA

pavlyk@wolfram.com

Abstract

After reviewing the underlying algebraic structures we give a unified realization of split exceptional groups $F_{4(4)}$, $E_{6(6)}$, $E_{7(7)}$, $E_{8(8)}$ and of $SO(n + 3, m + 3)$ as quasiconformal groups that is covariant with respect to their (Lorentz) subgroups $SL(3, \mathbb{R})$, $SL(3, \mathbb{R}) \times SL(3, \mathbb{R})$, $SL(6, \mathbb{R})$, $E_{6(6)}$ and $SO(n, m) \times SO(1, 1)$, respectively. We determine the spherical vectors of quasiconformal realizations of all these groups twisted by a unitary character ν . We also give their quadratic Casimir operators and determine their values in terms of ν and the dimension n_V of the underlying Jordan algebras. For $\nu = -(n_V + 2) + i\rho$ the quasiconformal action induces unitary representations on the space of square integrable