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A $\mathbb{Z}_4^3$-grading on a 56-dimensional simple structurable algebra and related fine gradings on the simple Lie algebras of type E

Comment.Math.Univ.Carolin. 55,3 (2014) 285 –313.

Abstract: We describe two constructions of a certain $\mathbb{Z}_4^3$-grading on the so-called Brown algebra (a simple structurable algebra of dimension 56 and skew-dimension 1) over an algebraically closed field of characteristic different from 2. The Weyl group of this grading is computed. We also show how this grading gives rise to several interesting fine gradings on exceptional simple Lie algebras of types E_6, E_7 and E_8.

Keywords: graded algebra; structurable algebra; exceptional simple Lie algebra
AMS Subject Classification: Primary 17B70; Secondary 17B25, 17C40, 17A30

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