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The unimodular degree and the w-index of a Kac-Moody root system

We introduce combinatorial analogues (the unimodular degree and the w-index) of two celebrated geometric invariants of a split simple simply connected linear algebraic group G to the Kac–Moody setting: the canonical dimension of G and the Grothendieck torsion index of G.

We prove finiteness of the unimodular degree for an arbitrary generalized Cartan matrix using coinvariant algebras over finite fields. In rank two, we determine the unimodular degree and obtain a product formula for all w-indices in terms of recursively defined dihedral polynomials. Finally, we use the 1-chains (type A) and 2-chains (type C) to obtain explicit lower bounds for all untwisted and twisted affine types. This is a joint work with Edward Richmond.