

ON THE MAHLER MEASURE OF THE COXETER POLYNOMIAL OF ALGEBRAS.

JOSÉ A. DE LA PEÑA

ABSTRACT. Let A be a finite dimensional algebra over an algebraically closed field k . Assume A is basic connected triangular with n pairwise non-isomorphic simple modules. We consider the *Coxeter transformation* $\phi_A(T)$ as the automorphism of the Grothendieck group $K_0(A)$ induced by the Auslander-Reiten translation τ in the bounded derived category $\text{Der}^b(\text{mod}_A)$ of the module category mod_A of finite dimensional left A -modules. We say that A is of *cyclotomic type* if the characteristic polynomial χ_A of ϕ_A is a product of cyclotomic polynomials, equivalently, if the *Mahler measure* $M(\chi_A) = 1$. We consider the many examples of algebras of cyclotomic type in the representation theory literature and show some common properties. We also consider algebras not of cyclotomic type with small Mahler measure of their Coxeter polynomial. In 1933, D. H. Lehmer found that the polynomial $T^{10} + T^9 - T^7 - T^6 - T^5 - T^4 - T^3 + T + 1$ has Mahler measure $\mu_0 = 1.176280\dots$, and he asked if there exist any smaller values exceeding 1. We prove that either $M(\chi_A) = 1$ or $M(\chi_A) \geq \mu_0$ for A in the class of strongly simply connected algebras.