

Some new signed Euler-Mahonian identities and polynomials

羅元勳

National Pingtung University

M. Wachs in 1992 derived a so-called signed Euler-Mahonian identity

$$\sum_{\pi \in \mathfrak{S}_{2n}} (-1)^{\ell(\pi)} t^{\text{des}(\pi)} q^{\text{maj}(\pi)} = \prod_{i=1}^n (1 - tq^{2i-1})^n \sum_{\pi \in \mathfrak{S}_n} t^{\text{des}(\pi)} q^{2\text{maj}(\pi)}.$$

In this talk, we extend above identity to Coxeter groups of types B_n , D_n , and the complex reflection group $G(r, 1, n)$, where the “sign” is taken to be any 1-dim character. Analogous generalizations of the identity

$$\sum_{\pi \in \mathfrak{S}_{2n+1}} (-1)^{\ell(\pi)} t^{\text{des}(\pi)} = (1-t)^n \sum_{\pi \in \mathfrak{S}_{n+1}} t^{\text{des}(\pi)},$$

which was proposed by J. Désarménien and D. Foata also in 1992, and some interesting signed Euler-Mahonian polynomials are derived as well.