A combinatorial representation of Coxeter groups over a field of two elements *

Hau-wen Huang^{\dagger} Chih-wen Weng ^{\ddagger}

March 13, 2008

Abstract

Let W denote a simply-laced Coxeter group with n generators. We construct an n-dimensional representation ϕ of W over the finite field F_2 of two elements. The action of $\phi(W)$ on F_2^n by left multiplication is corresponding to a combinatorial structure extracted and generalized from Vogan diagrams. In each case W of types A, D and E, we determine the orbits of F_2^n under the action of $\phi(W)$, and conclude that the kernel of ϕ is the center Z(W) of W.

^{*}Research partially supported by the NSC grant of Taiwan R.O.C..

[†] [‡]Department of Applied Mathematics National Chiao Tung University 1001 Ta Hsueh Road Hsinchu, Taiwan 300, R.O.C..