E1-25 On the self-homotopy equivalences of *BO(n)*

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Let G be a compact Lie Group and BG be the classifying space of G. The study of self homotopy equivalances of BG has been an area that generated a large amount of interest during the last few years. Though extensive work has been done on connected Lie Groups, the case of non-connected groups remains largely untouched.

In this Paper, I will give a complete description of the self-homotopy equivalances of $(BO(2n)_2$ $(BO(n)$ completed at the prime 2). When n is odd, $O(2n+1) \equiv SO(2n+1) \times Z/2Z$ and the case reduces to one dealing with a connected group. Our focus therefore, will be on $O(2n)$. Our method of attack is based on the fact that every compact Lie Group G contains a maximal Torus T.

Let $W = NT/T$ W is called the Weyl group of G.

Let $N_2{}^{\circ\,(2n)}\,T$ denote an extension of T by a 2-Sylow sub group of W. The fact is: even though a self homotopy equivalence of BG_2^ need not appear as a group Homomorphism of G, it does appear as an admissible map $\phi{:}T_\gamma \to T_\gamma$ (where T_γ is the subgroup of T containing all elements of order a power of 2) and as a special type of representation $\rho{:}N_2{}^{\circ\,(2n)}T \to G$ called a R_2 invariant representation. I shall start with a self-homotopy equivalence f of $(BO(2n)\hat{}_2$ and find the possible admissible maps and$_2$R invariant representations and then see which of these realise on $(BO(2n)\hat{}_2$ as self-homotopy equivalences. The conclusion being, for each 2-adic unit k there are exactly two distinct self-homotopy equivalences of $(BO(2n)\hat{}_2$ which act on T_γ in the manner $x \to x^k$ and this is a complete description.