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s-SMITH EQUIVALENT REPRESENTATIONS OF DIHEDRAL GROUPS

EUNG-CHUN CHO

Dihedral groups of order 2^m, for sufficiently large m, have nonisomorphic but s-Smith equivalent representations. That is, these groups can act smoothly and semilinearly on a homotopy sphere with two fixed points such that the isotropy representations at the fixed points are distinct.

1. Introduction. Let G be a finite group. If G acts smoothly on a closed homotopy sphere with exactly two fixed points, then the isotropy (or tangential) representations at these points are said to be Smith equivalent [**P2**]. If, in addition, the homotopy sphere Σ is semilinear, (i.e. the fixed set Σ^H is a homotopy sphere for every subgroup H of G [**R**]), then the isotropy representations are called s-Smith equivalent [**P2**]. The main result of this paper is

THEOREM A. *Dihedral groups of order 2^m, m sufficiently large, have nonisomorphic but s-Smith equivalent representations.*

Theorem A is a consequence of Theorem 3.4 which gives a sufficient condition for representations of dihedral groups to be s-Smith equivalent. Theorem 3.4 is followed by explicit examples of nonisomorphic but s-Smith equivalent representations of dihedral groups D_{2^m} of order 2^{m+1} for $m > 10$.

REMARK. At present, we know a class of cyclic groups [**P2**], certain abelian groups [**Su**], and generalized quaternion groups of order high powers of 2 [**Ch**] have nonisomorphic but s-Smith equivalent representations.

Following is a brief description of the general technique given by Petrie in [**P2**] and in [**PR**], which we will apply.

Let G be a finite group. Let V and W be representations of G satisfying certain conditions, which will be discussed in detail in §3 (see Theorem 3.4). Let Y be the unit sphere $S(V+R)$ of the representation $V+R$, where R is the trivial one dimensional real representation of G. If the fixed set V^G is $\{0\}$, then the fixed set Y^G consists of two points