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COHOMOLOGY COMPLEX PROJECTIVE SPACE WITH DEGREE ONE CODIMENSION-TWO FIXED SUBMANIFOLDS

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If M^{2n} is a cohomology $\mathbb{C}P^n$ and p is a prime, let $D_p(M^{2n})$ be the set of positive integers d such that $d \in D_p(M^{2n})$ if there exists a diffeomorphism of M^{2n} of order p fixing an orientable, codimension-2 submanifold of degree d. If $p = 2$ or n is odd, then $1 \in D_p(M^{2n})$ implies that $D_p(M^{2n}) = \{1\}$. The case p odd and n even is also investigated. If M^{4m} is a homotopy $\mathbb{C}P^{2m}$ and $m \not\equiv 0, 4,$ or 7 (mod 8), then $1 \in D_3(M^{4m})$ implies that $D_3(M^{4m}) = \{1\}$.

1. Introduction.

A cohomology complex projective n-space is a smooth, closed, orientable $2n$-manifold M^{2n} such that there is a class $x \in H^2(M;\mathbb{Z})$ with the property that $H^*(M;\mathbb{Z}) = \mathbb{Z}[x]/(x^{n+1})$. If $i : K^{2n-2} \subset M^{2n}$ is the inclusion map of a closed, connected, orientable submanifold and d is an integer, we will say that the degree of K^{2n-2} is d if $i_*[K]$ is the Poincaré dual of dx. We will always assume that the orientation of K^{2n-2} is chosen in such a way that d is nonnegative. Let p be a prime number and let G_p denote the cyclic group of order p. Let $D_p(M^{2n})$ be the set of positive integers d defined by the condition that $d \in D_p(M^{2n})$ if M^{2n} admits a smooth G_p action such that the fixed point set of the action contains a codimension-2 submanifold of degree d. If $d \in D_p(M^{2n})$, then $d \not\equiv 0 \pmod p$, (see [**2**, pp. 378-383]). The following conjecture is motivated by the work of several authors ([**3**], [**4**], [**6**], [**8**]).

Conjecture 1.0. *If $D_p(M^{2n})$ is nonempty, then $D_p(M^{2n}) = \{1\}$.*

This conjecture has been verified for small values of n ([**3**], Theorem A ($n = 3, p \geq 3, n = 4, p > 3$), [**4**], Corollary 4.5 ($n = 4, p = 2$), [**7**], Theorem 1.7 ($n = 4, p = 3$)). We begin this paper with the observation that a weaker version of the conjecture is true if $p = 2$ or n is odd.

Theorem 1.1. *Let M^{2n} be a cohomology complex projective n-space.*

(1) *If $p = 2$ and $1 \in D_2(M^{2n})$, then $D_2(M^{2n}) = \{1\}$.*