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WITT CLASSES OF INTEGRAL REPRESENTATIONS OF AN ABELIAN p-GROUP

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1. **Introduction.** For a Dedekind domain, R, the orthogonal and symplectic representations of a finite group, π, on finitely-generated projective inner-product modules over R admit a Witt equivalence relation, and the resulting equivalence classes form a commutative algebra, $\mathcal{W}_*(R, \pi)$, over the Witt ring of R. This concept has received considerable attention recently [2], [3], [4]. Our interest is motivated by the fact that $\mathcal{W}_*(Z, \pi)$ is so very specifically related to the bordism classification of smooth, orientation preserving actions of π on closed even-dimensional manifolds. We shall discuss

(1.1) THEOREM. *If, for p an odd prime, π is an abelian p-group then $\mathcal{W}_*(Z, \pi)$ contains no torsion.*

A corollary of (1.1) is that for an action (π, M^{2k}) of such a group on a closed oriented manifold, the Atiyah-Singer-Segal G-signature theorem [1] determines the integral Witt class of $(\pi, H^*(M; Z)/\mathrm{tor})$ uniquely. The present techniques may also be applied to determine $\mathcal{W}_*(Z, \pi)$ for an abelian 2-group, however torsion is present always. Thus for an orientation preserving action (π, M^{2k}) of an abelian 2-group, a torsion valued invariant, as well as the multisignature, must be computed.

By rough analogy with [5, IV, (3.3)] there is

(1.2) LEMMA. *For any p-group*

$$\mathcal{W}_2(Z, \pi) \simeq \mathcal{W}_2(Z(1/p), \pi),$$

and there is a split short exact sequence

$$0 \longrightarrow \mathcal{W}_0(Z, \pi) \longrightarrow \mathcal{W}_0(Z(1/p), \pi) \longrightarrow \mathcal{W}(Z_p) \longrightarrow 0.$$

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