ERRATUM TO “A QUOTIENT CRITERION FOR SYZYGIES IN EQUIVARIANT COHOMOLOGY”

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Abstract. We correct a mistake in Proposition 3.3 of the paper. All other results remain unchanged.

The proof of Proposition 3.3(ii) in [1] is incorrect. To address this, we modify the statement and proof of this part. We also take the opportunity to point out two minor inaccuracies in [1]: In line 2 after equation (1.3), rank Q denotes the common dimension of the orbits in X lying over the interior of Q . In line 2 before Section 2.2, we call K an *isotropy subtorus occurring in X* if it is the identity component of the isotropy group T_x of some $x \in X$.

The corrected proposition reads as follows:

Proposition 3.3.

(i) For any subtorus $K \subset T$,

$$\text{depth}_R H_T^*(X^K) \geq \text{depth}_R H_T^*(X).$$

(ii) $H_T^*(X)$ is a j -th syzygy if and only if

$$\text{depth}_{R_L} H_L^*(X^K) \geq \min(j, \dim L)$$

for any subtorus $K \subset T$ with quotient $L = T/K$. If X is a T -manifold, then it suffices to look at the isotropy subtori K occurring in X .

(iii) If $H_T^*(X)$ is a j -th syzygy over R , then so is $H_L^*(X^K)$ over R_L for any subtorus $K \subset T$ with quotient $L = T/K$.

Since Proposition 3.3(ii) is only applied to T -manifolds in [1], this change does not affect the rest of the paper.

DOI: 10.1007/s00031-019-09520-z

*Supported by an NSERC Discovery Grant.

Received September 25, 2018. Accepted November 8, 2018.

Published online April 5, 2019.

The online version of the original article can be found at

<https://doi.org/10.1007/s00031-016-9408-3>.

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Proof. Part (i) and the equivalence in part (ii) are established by the same arguments as in [1].

Consider now a T -manifold X satisfying the depth condition for all isotropy subtori occurring in it, and let $K \subset T$ be a subtorus that does not occur. Each connected component Y of X^K is a T -manifold. Let $T/\tilde{K}$ be the principal orbit type of Y . Then the identity component K' of $\tilde{K}$ occurs in X and properly contains K , and Y is a connected component of $X^{K'}$. Write $\dim K' = \dim K + s$ and $L' = T/K'$. By assumption and Lemma 3.1 (ii), we have

$$\begin{aligned} \operatorname{depth}_{R_L} H_L^*(Y) &\geq \operatorname{depth}_{R_L} H_L^*(X^{K'}) = \operatorname{depth}_{R_{L'}} H_{L'}^*(X^{K'}) + s \\ &\geq \min(j, \dim L') + s \geq \min(j, \dim L). \end{aligned}$$

Because this holds for any connected component Y of X^K , the depth condition is satisfied for K , too.

The proof of part (iii) remains unchanged, except that one takes all subtori of $L = T/K$ into account and not just the ones appearing in X . $\square$

The mistake made in [1] is that for an arbitrary T -space X and a subtorus $K \subset T$ the fixed point set X^K is in general not the disjoint union of fixed point sets of subtori K' occurring in X .

Acknowledgements. I am grateful to Sergio Chaves for discussions that have led to the discovery of the error.

References

- [1] M. Franz, *A quotient criterion for syzygies in equivariant cohomology*, Transform. Groups **22** (2017), no. 4, 933–965.