Spherical classes and the lambda algebra

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Abstract: Let ???? = ?? ??$_k$?? be Singer's invariant-theoretic model of the dual of the lambda algebra with H $_k$(????) ?? Tor$_k^A$($_{2,2}$), where A denotes the mod 2 Steenrod algebra. We prove that the inclusion of the Dickson algebra, Dk, into ??$_k$?? is a chain-level representation of the Lannes-Zarati dual homomorphism *$_k$: $_2$??$_A$D$_k$?? Tor$_k^A$($_{2,2}$)??H $_k$(????). The Lannes-Zarati homomorphisms themselves, $_k$, correspond to an associated graded of the Hurewicz map H : ??*^{S}(S^0) ?? - H(Q_0S^0). Based on this result, we discuss some algebraic versions of the classical conjecture on spherical classes, which states that Only Hopf invariant one and Ke. rva. ire. invariant one classes are detected by the Hurewicz homomorphism. One of these algebraic conjectures predicts that every Dickson element, i. e. element in D/t, of positive degree represents the homology class 0 in Torj4(F2,F2) for k2. We also show that factors through F_2Kerd$_k$, where d$_k$denotes the differential of PA. Therefore, the problem of determining F_2Ker?$_k$should be of interest. ?? 2001 American Mathematical Society.

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