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TWO TORSION IN H-SPACES

BY JOHN R. HARPER AND JAMES P. LIN

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The objective of this note is to announce theorems about two torsion in H-spaces. We say that X is a *finite* H-space if it has the homotopy type of a finite CW complex. Throughout this paper we assume that X is any simply connected, finite H-space whose mod two homology ring $H_*(X; Z_2)$ is associative. Every known finite simply connected H-space satisfies this assumption.

THEOREM 1. *Let ΩX be the space of basepointed loops on X. Then $H_*(\Omega X; Z)$ has no two torsion, and $H_*(\Omega X; Z_2)$ is concentrated in even degrees.*

THEOREM 2. *The two torsion coefficients of $H^*(X; Z)$ are of order at most two.*

THEOREM 3. *There are no even degree algebra generators in the* mod *two cohomology ring, $H^*(X; Z_2)$.*

THEOREM 4 (HUREWICZ MAP). *The kernel of the two-local Hurewicz homomorphism $h_* \otimes Z_{(2)}\colon \Pi_*(X) \otimes Z_{(2)} \longrightarrow H_*(X; Z_{(2)})$ is the two torsion of $\Pi_*(X)$.*

Thus, the first nonvanishing homotopy group of X is two torsion free.

In the case that X is a simply connected Lie group, the above results were proven by appealing to the underlying differentiable manifold structure of the group. Details and proofs will appear elsewhere.

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DEPARTMENT OF MATHEMATICS, UNIVERSITY OF ROCHESTER, ROCHESTER NEW YORK 14627

DEPARTMENT OF MATHEMATICS, UNIVERSITY OF CALIFORNIA, SAN DIEGO, LA JOLLA, CALIFORNIA 92093

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