THEOREM 4. *If X is an aspherical polyhedron, then $p_*\pi_1(X^X, 1_X) = Z(\pi_1(X, x_0))$, the center of $\pi_1(X, x_0)$.*

Theorems 2 and 4 combine to give us the following corollaries:

COROLLARY 5. *If X has the same homotopy type as a compact, connected, aspherical polyhedron with nonzero Euler-Poincaré number, then $Z(\pi_1(X, x_0)) = 0$.*

John Stallings, in [4], has put this result in a purely algebraic setting; namely, if a group G admits a finite resolution, then, if $Z(G)$ is nontrivial, the (suitably defined) Euler-Poincaré number is zero.

Alexander's Duality and the last corollary gives us a result suggested by L. P. Neuwirth.

COROLLARY 6. *Suppose that X is a subcomplex of the n-sphere S^n whose Euler characteristic is different from that of S^n. If $S^n - X$ is connected and aspherical, then $\pi_1(S^n - X)$ has no center.*

Finally, we are able to show the following:

THEOREM 7. *If X is aspherical, then*

$$\pi_1(X^X, 1_X) \cong Z(\pi_1(X, x_0)),$$
$$\pi_n(X^X, 1_X) \cong 0, \qquad n > 1.$$

Note that Theorem 7 and Theorem 2 give us:

COROLLARY 8. *If X has the homotopy type of an aspherical compact polyhedron whose Euler characteristic is different from zero, then the identity component of X^X is contractible.*

BIBLIOGRAPHY

1. Jaing Bo-ju, *Estimation of the Nielsen numbers*, Chinese Math. 5 (1964), 330–339.
2. D. H. Gottlieb, *A certain subgroup of the fundamental group*, Amer. J. Math. (to appear).
3. G. S. McCarty, *Homeotopy groups*, Trans. Amer. Math. Soc. 106 (1963), 293–304.
4. John Stallings, *Centerless groups—An algebraic formulation of Gottlieb's theorem* (to appear).
5. F. Wecken, *Fixpunktklassen*. I, Math. Ann. 117 (1941), 659–671; II, ibid. 118 (1941), 216–234; III, ibid. 118 (1942), 544–577.

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