

Abstract for: On the Classification of 3-stage Postnikov Towers

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We consider Hurewicz fibrations whose fibres are products of Eilenberg-MacLane spaces, i.e. of the form $K(G, m) \times K(H, n)$ where G and H are Abelian groups and $1 < m < n$ are integers. The classification problem for such fibrations is investigated in the case where G, m, H, n and the base space B are fixed, with B a simply-connected CW-complex and H -cogroup. Our technique views them in terms of their Moore-Postnikov factorizations.

The fibrations are classified up to a strong form of fibrewise homotopy equivalence by the elements of the group

$$H^{m+1}(B; G) \oplus H^{n+1}(B; H) \oplus \sum_j H^j(B; H^{n+1-j}(K(G, m); H)),$$

where the summation ranges over $1 \leq j \leq n-m$. They are classified up to the standard form of fibrewise homotopy equivalence by the orbits of the above sum of cohomology groups under an explicitly defined action of the group of homotopy classes of self-homotopy equivalences of $K(G, m) \times K(H, n)$, i.e. a group of lower triangular 2×2 matrices.

In the case $1 < m < n < 2m$ the problem is reduced an algebraic computation using cohomology groups of B and $K(G, m)$, and homomorphisms between those groups induced by automorphisms of G and H , and by cohomology operations in $O(m+1, n+1; G, H)$.