21. *On the Type of an Associative H-space*

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1. Introduction. Let X be an H-space. If the rational cohomology of X is an exterior algebra on a finite number of odd dimensional generators, then the number of such generators is called the rank of X.

The type of X is the dimensions in which the generators occur. In this paper, we obtain by the analogous method as in [3], [4], some result on an associative H-space of rank n.

Theorem. *Let X be a connected associative H-space of rank n with $H_*(X;Z)$ finitely generated as an abelian group. Let a be the generator of the rational cohomology $H^*(X;Q)$. If the degree of the generator a is $2i-1$, then we have*

$$\varphi(i) \leqq n,$$

where φ is the Euler function.

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2. Some results on unstable polyalgebras.

Definition. A polynomial algebra B over the mod p Steenrod algebra A_p(p: prime) is called an unstable polyalgebra over A_p, if it is an algebra that is a left A_p-module satisfying

(1) $P_p^k x = 0$ if $2k > \deg x$

(2) $P_p^k x = x^p$ if $2k = \deg x$

where we denote Sq^{2m} by P_2^m. This terminology is found in Larry Smith's paper [4].

The next theorem is fundamental in this paper.

Theorem (A. Clark [1]). *Let B be an algebra over the Steenrod algebra A_p and suppose that B is a polynomial algebra over Z_p on generators of even degree. If $2m$ is the degree of a generator of B, then B has a generator in some degree $2n$ for which $n \equiv 1-p$* mod m, *or else $m \equiv 0$* mod p.

Lemma 2.1. *Let B be an unstable polyalgebra over A_p(p:odd prime) on a finite number of even dimensional generators $x_1, \cdots, x_i, \cdots \cdots, x_n$ where deg $x_i = 2j_i$ and $p > j_i > 1$.*

Then the integer j_i satisfies one of the following conditions (A)