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THE ADMISSIBLE MONOMIAL BASIS FOR THE POLYNOMIAL ALGEBRA OF FIVE VARIABLES IN DEGREE FOURTEEN

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Abstract: Let P_k be the graded polynomial algebra $\mathbb{F}_2[x_1, x_2, \ldots, x_k]$ with the degree of each generator x_i being 1, where $\mathbb{F}_2$ denote the prime field of two elements. We study the *hit problem*, set up by Frank Peterson, of finding a minimal set of generators for the polynomial algebra P_k as a module over the mod-2 Steenrod algebra, $\mathcal{A}$. In this paper, we explicitly determine all admissible monomials for the case $k = 5$ in degree fourteen.

Keywords and Phrases: Steenrod squares, hit problem, algebraic transfer.

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1. Introduction and Statement of Results

Denote by $P_k = H^*((\mathbb{R}P^\infty)^k)$ the modulo-2 cohomology algebra of the direct product of k copies of infinite dimensional real projective spaces $\mathbb{R}P^\infty$. Then, P_k is isomorphic to the graded polynomial algebra $\mathbb{F}_2[x_1, x_2, \ldots, x_k]$ of k variables, in which each x_j is of degree 1. Here the cohomology is taken with coefficients in the prime field $\mathbb{F}_2$ of two elements.

The $\mathcal{A}$-module structure of P_k is explicitly determined by the formula

$$Sq^i(x_j) = \begin{cases} x_j, & i = 0, \\ x_j^2, & i = 1, \\ 0, & i > 1, \end{cases}$$

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