J. Math Kyoto. Univ.
4-2 (1965) 301-326

On the generalized Hopf homomorphism and the higher composition.

Part II. $\pi_{n+i}(S^n)$ for $i=21$ and 22.

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(Received in Nov. 11, 1964)

Introduction

The present paper is the continuation of the previous one [2] and is devoted to the computation of $\pi_{n+i}(S^n)$, the $(n+i)$-th homotopy group of the n-sphere for $i=21$ and 22.

The 2-primary components of $\pi_{n+i}(S^n)$, which we denote by π^n_{n+i}, are determined in [4] for $i\leqq 19$ and in [1] for $i=20$.

The main results of this paper are stated as follows by making use of *generators* given in [4] and [1].

Theorem A.

$$\pi^2_{23}=\{\eta_2\circ\nu'\circ\bar{\mu}_6,\ \eta_2\circ\nu'\circ\eta_6\circ\mu_7\circ\sigma_{16}\}\cong Z_2\oplus Z_2,$$

$$\pi^3_{24}=\{\nu'\circ\eta_6\circ\bar{\mu}_7\}\cong Z_2,$$

$$\pi^4_{25}=\{E\nu'\circ\eta_7\circ\bar{\mu}_8,\ \nu_4\circ\zeta_7\circ\sigma_{18},\ \nu_4\circ\eta_7\circ\bar{\mu}_8\}\cong Z_2\oplus Z_8\oplus Z_2,$$

$$\pi^5_{26}=\{\alpha,\ \nu_5\circ\eta_8\circ\bar{\mu}_9\}\cong Z_2\oplus Z_2,\quad \alpha\in E^{-1}(\eta_6\circ\bar{\kappa}_7),$$

$$\pi^6_{27}=\{\eta_6\circ\bar{\kappa}_7\}\cong Z_2$$

$$\pi^7_{28}=\{\eta_7\circ\bar{\kappa}_8,\ \sigma'\circ\kappa_{14}\}\cong Z_2\oplus Z_2,$$

$$\pi^8_{29}=\{\eta_8\circ\bar{\kappa}_9,\ E\sigma'\circ\kappa_{15},\ \sigma^3_8,\ \sigma_8\circ\kappa_{15}\}\cong Z_2\oplus Z_2\oplus Z_4\oplus Z_2,$$

$$\pi^9_{30}=\{\eta_9\circ\bar{\kappa}_{10},\ \sigma_9\circ\kappa_{16},\ \sigma^3_9\}\cong Z_2\oplus Z_2\oplus Z_2,$$

$$\pi^{10}_{31}=\{\eta_{10}\circ\bar{\kappa}_{11},\ \sigma_{10}\circ\kappa_{17},\ \sigma^3_{10}\}\cong Z_2\oplus Z_2\oplus Z_2,$$

$$\pi^{11}_{32}=\{\eta_{11}\circ\bar{\kappa}_{12},\ \sigma_{11}\circ\kappa_{18},\ \sigma^3_{11},\ \theta'\circ\mu_{23}\}\cong Z_2\oplus Z_2\oplus Z_2\oplus Z_2,$$

$$\pi^{12}_{33}=\{\eta_{12}\circ\bar{\kappa}_{13},\ \sigma_{12}\circ\kappa_{19},\ \sigma^3_{12},\ E\theta'\circ\mu_{24},\ \theta\circ\mu_{24}\}$$