Hirato, Yoshihiro; **Kachi, Hideyuki**; **Mimura, Mamoru**
Homotopy groups of the homogeneous spaces F_4/G_2 and $F_4/\mathbf{Spin}(9)$. (English) Zbl 0998.55006
JP J. Geom. Topol. 1, No. 1, 59-109 (2001).

Let G_2 and F_4 be the classical exceptional Lie groups of rank 2 and 4 respectively. In this paper, the authors calculate 2-primary components of homotopy groups of homogeneous spaces F_4/G_2 and $F_4/\mathrm{Spin}(9)$. More precisely, they determine $\pi_i(F_4/G_2 : 2)$ for $i \leq 45$ and $\pi_i(F_4/\mathrm{Spin}(9) : 2)$ for $i < 38$. The main tools are the homotopy exact sequences associated with the 2-local fibration $S^{15} \to F_4/G_2 \to S^{23}$ and with the fibration $S^7 \to \Omega(F_4/\mathrm{Spin}(9)) \to \Omega S^{23}$ introduced by *D. M. Davis* and *M. Mahowald* [J. Math. Soc. Japan 43, No. 4, 661-672 (1991; Zbl 0736.57020)]. The determination of the group extensions arising from these sequences is done by using Toda brackets, as in Theorem 2.1 of [*M. Mimura* and *H. Toda*, J. Math. Kyoto Univ. 3, 217-250 (1964; Zbl 0129.15404)].

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