ON THE SUZUKI AND CONWAY GROUPS

BY J. H. LINDSEY II

Communicated by Michio Suzuki, February 24, 1970

The Suzuki and Conway groups were constructed from the six-dimensional complex representation of a central extension of Z_6 by $PSU_4(3)$ in [2]. In fact, if Q is the rational number field, $\sqrt{-3} = \sqrt{3}i = w - \bar{w}$, $w = (-1+\sqrt{3}i)/2$, and $w^3 = 1$, then the following unitary matrices $M_1, \cdots, M_6$ generate a central extension H of Z_6 by the Suzuki group of order $2^{13}3^7 5^2 7(11)(13)$:

$$M_1 = \frac{1}{\sqrt{(-3)}}\left[\begin{pmatrix}1 & 1 & 1\\ 1 & w & \bar{w}\\ 1 & \bar{w} & w\end{pmatrix} \oplus \begin{pmatrix}-1 & -1 & -1\\ -1 & -\bar{w} & -w\\ -1 & -w & -\bar{w}\end{pmatrix} \oplus \begin{pmatrix}-\bar{w} & -w & -1\\ -w & -\bar{w} & -1\\ -1 & -1 & -1\end{pmatrix} \oplus \begin{pmatrix}1 & 1 & 1\\ 1 & w & \bar{w}\\ 1 & \bar{w} & w\end{pmatrix}\right],$$

$$M_2 = \mathrm{diag}(w, w, w, w, w, w, \bar{w}, \bar{w}, \bar{w}, \bar{w}, \bar{w}, \bar{w}).$$

The following denote permutation matrices where our 12 variables are $x_1, \cdots, x_6, x_{1'}, \cdots, x_{6'}$.

$$M_3 = (1\ \ 2\ \ 3)(1'\ \ 2'\ \ 3')(4'\ \ 5'\ \ 6'),$$
$$M_4 = (4\ \ 5\ \ 6)(1'\ \ 2'\ \ 3')(4'\ \ 6'\ \ 5'),$$
$$M_5 = (1\ \ 2\ \ 6)(4'\ \ 3'\ \ 2')(1'\ \ 6'\ \ 5'),$$
$$M_6 = (1\ \ 2\ \ 1')(5\ \ 4'\ \ 4)(6\ \ 5'\ \ 6').$$

A lattice $\mathfrak{L}$ fixed by H can be defined in terms of the following partitions $\{1, \cdots, 6'\} = S_i \cup C(S_i)$, $i = 1, 11$. These partitions are permuted by the above permutation matrices:

$$S_1 = \{1, 2, 3, 4, 5, 6\},$$
$$S_2 = \{1, 2, 3, 1', 2', 3'\},$$
$$S_3 = \{1, 2, 4, 2', 4', 5'\},$$
$$S_4 = \{1, 2, 5, 3', 4', 6'\},$$

AMS 1969 *subject classifications.* Primary 2072, 2075; Secondary 2025, 2029.
Key words and phrases. Leech lattice, Conway group, Suzuki group.