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Maximal Subgroups of the Sporadic Simple Group of Rudvalis

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Abstract

The maximal subgroups of the Rudvalis sporadic simple group are completely classified up to conjugacy.

1 Introduction.

The Rudvalis group *Rud* is one of the six sporadic finite simple groups which are not involved in the Fischer-Griess Monster. The aim of this paper is to classify the maximal subgroups of *Rud*, where we use ATLAS notation to denote the isomorphism types of groups [2].

Theorem 1.1 *The Rudvalis simple group of order* $2^{14} \cdot 3^3 \cdot 5^3 \cdot 7 \cdot 13 \cdot 29$ *has exactly* 15 *conjugacy classes of maximal subgroups. The isomorphism types of the representatives are as follows:*

(*A*) *Four 2-local subgroups:*

(1) $2 \cdot 2^{4+6}:S_5$,
(2) $2^{3+8}:L_2(7)$,
(3) $2^6 \cdot G_2(2)$ *(non-split)*,
(4) $(2^2 \times Sz(8)):3$.

(*B*) *One 3-local and three 5-local subgroups:*

(5) $(3 \cdot A_6) \cdot 2^2$,
(6) $(5_+^{1+2}:Q_8) \cdot 4$,
(7) $5^2:GL_2(5)$,
(8) $(5:4) \times A_5$.

(*C*) *Seven non-local subgroups:*

(9) ${}^2F_4(2)$,
(10) $U_3(5).2$,
(11) A_8,
(12) $L_2(25):2^2$,
(13) $L_2(29)$,
(14) $PGL_2(13)$,
(15) $A_6 \cdot 2^2$.

It should be mentioned that the same result has also obtained by R. Wilson [10] by fully using computer for calculating matrices of degree 28. The original version of the present paper was written in 1984, completely independent from Wilson's work (see p. 248 in [2]). Since the methods I used in that paper are not so dramatically different from those used by Wilson, I did not submit the paper. However, I have been asked by several people where my paper appeared and some of them kindly encouraged me to publish it. Thus I decided to publish it, in order to make it easy to access and to stress a difference between my method and Wilson's: that is, in the present paper, the classification has done without using computer. In particular, the existence