A CHARACTERIZATION OF $S_{p_6}(2)$

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Yamaki [6], [7] has characterized the simple groups having the centralizer of an involution isomorphic to the centralizer of a transvection in $S_{p_6}(2)$. His result is that such a simple group must be isomorphic to $S_{p_6}(2)$, A_{12}, or A_{13}. But a Sylow 2-subgroup of $S_{p_6}(2)$ contans three central involutions whose centralizers are nonisomorphic. The purpose of this paper is to prove the following result.

THEOREM. *Let t_0 be an involution in the center of a Sylow 2-subroup of $S_{p_6}(2)$ such that t_0 is not a transvection. Let H_0 be the centralizer of t_0 in $S_{p_6}(2)$. Let G be a finite simple group containing an involution t such that $C_G(t) \simeq H_0$. Then $G \simeq S_{p_6}(2)$.*

The notation we use is standard. For example:

$\{x, y, \cdots\}$	The set of elements $x, y, \cdots$
$\langle x, y, \cdots \rangle$	The group generated by $x, y, \cdots$
$[x, y]$	$x^{-1}y^{-1}xy$
x^y	$y^{-1}xy$
$x \sim_H y$	x is conjugate to y in H
$cl_H(x)$	The set of elements of H which are conjugate to x in H.
$O_{2'}(G)$	The largest normal odd order subgroup of G.
$\mathcal{N}_G(X, 2')$	The set of odd order subgroups normalized by X which intersect X trivially.

1. Preliminary lemmas

Let G_0 be a group generated by the set of elements

$$\{u_i, w_j \mid 1 \leq i \leq 9, 1 \leq j \leq 3\}$$

with the following relations (for brevity we shall write $u_{ij} = u_i u_j$):

$$(1.1) \qquad u_i^2 = 1 \quad \text{for } 1 \leq i \leq 9$$

$$[u_i, u_j] = 1 \quad \text{for } 4 \leq i, j \leq 9$$

$$(u_{13})^2 = u_2$$

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