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# Cyclic Partition For The Groups Of PSL(2,41) And PSL(2,43)

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# Cyclic partition for the groups of $\mathcal{PSL}(2,41)$ and $\mathcal{PSL}(2,43)$

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**ABSTRACT**

The ordinary character table and the character table (cha.ta.) of rational representations (ra.repr.) for projective special linear groups $\mathcal{PSL}$ (2,41) and $\mathcal{PSL}$ (2,43) find in this work to find the cyclic partition for each group

## 1. Introduction

The projective special linear group denoted by $\mathcal{PSL}$(n,F) gain it by factor out the special linear group $\mathcal{SL}$ (n,F) by its center, [8,9]. Author in [6] proved that for any cyclic P–group G, K(G) = $Z_p$ and K(G) = $\overset{n}{\underset{i=1}{\oplus}} Z_{P^i}$ for any cyclic group G of order $P^n$.

## 2- Base for the $\mathcal{PSL}$(n,F)

In this section we display some notions.

**Theorem 2.1:** [2]

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**(i)** The group PSL(2,$s^v$) is simple for $s^v > 3$.

**(ii)** $$|PSL(2,s^v)| = \begin{cases} (s^v+1)s^v(s^v-1) & if\ s=2 \\ \frac{1}{2}(s^v+1)s^v(s^v-1) & if\ s\ is\ prime\ s\neq 2 \end{cases}$$

## 3. Prime Effect

We employ the acumen in [1,3-5,7,10-12] to find the cyclic partition for $\mathcal{PSL}$ (2,41) and $\mathcal{PSL}$ (2,43).

### 3.1 The effect for $\mathcal{PSL}$(2,41)

$|\mathcal{PSL}\ (2,41)| = 68880$.

The (cha. ta.) of (ra.repr.) for $\mathcal{PSL}$(2,41) is

| $C_g$ | $<z>$ | $<z>c$ | $<z>a$ | $<z>a^2$ | $<z>a^4$ | $<z>b^1$ | $<z>b^2$ |
|---|---|---|---|---|---|---|---|
| $\vert C_g\vert$ | 1 | 840 | 1722 | 1722 | 1722 | 1640 | 1640 |
| $\vert C_G(g)\vert$ | 34440 | 41 | 20 | 20 | 20 | 21 | 21 |
| $1_G$ | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| $\Psi$ | 41 | 0 | 1 | 1 | 1 | -1 | -1 |
| $\chi_2+\chi_4+\chi_6+\chi_8+\chi_{12}+\chi_{16}+\chi_{18}$ | 378 | 8 | 0 | 0 | -4 | 0 | 0 |
| $\chi_{10}$ | 42 | 1 | 1 | 0 | -2 | 0 | 0 |
| $\chi_{14}$ | 40 | -1 | 0 | 0 | 0 | 1 | 1 |
| $\theta_2+\theta_4+\theta_6+\theta_8+\theta_{10}+\theta_{12}+\theta_{14}+\theta_{16}+\theta_{18}+\theta_{20}$ | 320 | -8 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | |
| $\xi_1+\xi_2$ | 42 | 1 | -2 | 2 | 2 | 0 | 0 |

The diagonalization matri

$$\begin{pmatrix} 34440 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -5 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 6 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 5 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -7 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 4 \end{pmatrix}$$

Thus

K($\mathcal{PSL}$ (2,41)) $= Z_{34440} \oplus Z_5 \oplus Z_6 \oplus Z_5 \oplus Z_7 \oplus Z_1 \oplus Z_4$

### 3.2 The a effect for $\mathcal{PSL}$(2,43)

$|\mathcal{PSL}\ (2,43)| = 39732$.

The (cha. ta.) of (ra.repr.) for $\mathcal{PSL}$(2,43) is

| Cg | $<z>$ | $<z>c$ | $<z>a$ | $<z>a^3$ | $<z>b^1$ | $<z>b^2$ |
|---|---|---|---|---|---|---|
| \| Cg \| | 1 | 924 | 1892 | 1892 | 1806 | 1806 |
| \| CG(g) \| | 39732 | 43 | 21 | 21 | 22 | 22 |
| 1G | 1 | 1 | 1 | 1 | 1 | 1 |
| $\Psi$ | 43 | 0 | 1 | 1 | -1 | -1 |
| $\chi_2+\chi_4+\chi_6+\chi_8+\chi_{10}+\chi_{12}+\chi_{16}+\chi_{18}+\chi_{20}$ | 396 | 9 | 0 | -3 | 0 | 0 |
| $\chi_{14}$ | 44 | 1 | -1 | 2 | 0 | 0 |
| $\theta_2+\theta_4+\theta_6+\theta_8+\theta_{10}+\theta_{12}+\theta_{14}+\theta_{16}+\theta_{18}+\theta_{20}$ | 420 | -10 | 0 | 0 | 0 | 2 |
| $\eta_1+\eta_2$ | 42 | -1 | 0 | 0 | 2 | -2 |

The diagonalization matrix of it is

$$\begin{pmatrix} 39732 & 0 & 0 & 0 & 0 & 0 \\ 0 & 3 & 0 & 0 & 0 & 0 \\ 0 & 0 & 7 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 11 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \end{pmatrix}$$

Thus

$K(\mathcal{PSL}(2,43)) = Z_{39732} \oplus Z_3 \oplus Z_7 \oplus Z_1 \oplus Z_{11} \oplus Z_1$

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