

## ELLIPTIC ELEMENTS AND CIRCUITS IN SUBORBITAL GRAPHS

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### Abstract

We consider the action of a permutation group on a set in the spirit of the theory of permutation groups, and graph arising from this action in hyperbolic geometric terms. In this paper, we examine some relations between elliptic elements and circuits in graph for the normalizer of  $\Gamma_0(N)$  in  $PSL(2, \mathbb{R})$ .

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### 1. Introduction

Let  $PSL(2, \mathbb{R})$  denote the group of all linear fractional transformations

$$T : z \mapsto \frac{az + b}{cz + d}, \text{ where } a, b, c \text{ and } d \text{ are real and } ad - bc = 1.$$

In terms of the matrix representation, the elements of  $PSL(2, \mathbb{R})$  correspond to the matrices

$$\pm \begin{pmatrix} a & b \\ c & d \end{pmatrix}; a, b, c, d \in \mathbb{R} \text{ and } ad - bc = 1.$$

This is the automorphism group of the upper half plane  $\mathbb{H} := \{z \in \mathbb{C} : \text{Im}(z) > 0\}$ . The modular group  $\Gamma$  is the subgroup of  $PSL(2, \mathbb{R})$  such that  $a, b, c$  and  $d$  are integers.  $\Gamma_0(N)$  is the subgroup of  $\Gamma$  with  $N|c$ .

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