

## Abstract

In a recent work, Basmajian and Maskit have investigated the problem of finding involution and commutator lengths of the isometry group of real space forms. In this thesis we aim to investigate the problem for isometry group of the complex hyperbolic space. A  $k$ -reflection of the  $n$ -dimensional complex hyperbolic space  $H_n \mathbb{C}$  is an element in  $U(n; 1)$  with negative type eigenvalue  $-1$ ,  $j = 1, \dots, k$ , of multiplicity  $k+1$  and positive type eigenvalue  $1$  of multiplicity  $n - k$ . We prove that every element in  $SU(n)$  is a product of at most five involutions using which it can be shown that a holomorphic isometry of  $H_n \mathbb{C}$  is a product of at most four involutions and a complex  $k$ -reflection,  $k \geq 2$ . We also give a short proof of the well-known result that every holomorphic isometry of  $H_n \mathbb{C}$  is a product of two anti-holomorphic involutions.