

1106-11-588

**Sungjin Kim\*** (707107@gmail.com), 3767 Mentone Ave #306, Los Angeles, CA 90034. *Average of the First Invariant Factor of the Reductions of Abelian Varieties of CM Type.*

For a field of definition  $k$  of an abelian variety  $\mathcal{A}$  and prime ideal  $\mathfrak{p}$  of  $k$  which is of a good reduction for  $\mathcal{A}$ , the structure of  $\mathcal{A}(\mathbb{F}_{\mathfrak{p}})$  as abelian group is:

$$\mathcal{A}(\mathbb{F}_{\mathfrak{p}}) \simeq \mathbb{Z}/d_1(\mathfrak{p})\mathbb{Z} \oplus \cdots \oplus \mathbb{Z}/d_g(\mathfrak{p})\mathbb{Z} \oplus \mathbb{Z}/e_1(\mathfrak{p})\mathbb{Z} \oplus \cdots \oplus \mathbb{Z}/e_g(\mathfrak{p})\mathbb{Z}, \quad (1)$$

where  $d_i(\mathfrak{p})|d_{i+1}(\mathfrak{p})$ ,  $d_g(\mathfrak{p})|e_1(\mathfrak{p})$ , and  $e_i(\mathfrak{p})|e_{i+1}(\mathfrak{p})$  for  $1 \leq i < g$ .

We are interested in finding an asymptotic formula for the number of prime ideals  $\mathfrak{p}$  with  $N\mathfrak{p} < x$ ,  $\mathcal{A}$  has a good reduction at  $\mathfrak{p}$ ,  $d_1(\mathfrak{p}) = 1$ . We succeed in this under the assumption of the Generalized Riemann Hypothesis (GRH). Unconditionally, we achieve a short range asymptotic for abelian varieties of CM type, and the full cyclicity theorem for elliptic curves over a number field containing CM field. (Received September 02, 2014)