TSUKUBA J. MATH.
Vol. 12 No. 2 (1988), 507—519

SOME CRITERIA FOR REDUCIBLE ABELIAN VARIETIES

By

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Dedicated to Professor Yukihiro Kodama on his 60th birthday

Introduction.

A principally polarized abelian variety is called reducible if it is isomorphic to a product of two abelian varieties of positive dimensions. For a principally polarization L, it is well known that $L^{\otimes 2}$ determines a morphism. Its image is called a Wirtinger variety. If a principally polarized abelian variety is irreducible, then the Wirtinger variety coincides with the Kummer variety associated to this polarized abelian variety. Moreover if an abelian variety is sufficiently general, then the Wirtinger variety is not contained in any conics. On the other hand, if a principally polarized abelian variety is reducible, then the Wirtinger variety is contained in many conics. Our main purpose is to give conditions for reducibility of an abelian variety in terms of conics which contains the Wirtinger variety associated to the abelian variety.

Notations.

char(k): The characteristic of a field k

k^*: The group of all units of a field k

f^*: The pull back defined by a morphism f

$G^\wedge$: The character group of a finite group G

$\underline{L}$: The invertible sheaf associated to a line bundle L

$\mathcal{O}(D)$: The invertible sheaf associated to a divisor D

$K(\mathcal{L})$: The subgroup of an abelian variety defined as follows, $K(\mathcal{L})=\{x\in A;\ T_x^*(\mathcal{L})\cong\mathcal{L}\}$ where T_x is a translation morphism on A and $\mathcal{L}$ is an invertible sheaf on A

$NS(A)$: The Néron-Severi group on a variety A

S^nV: The n-th symmetric product of a vector space V

Map(A, B): The set of all maps from a set A to a set B

$\Gamma(A, \mathcal{L})$: The global sections of an invertible sheaf $\mathcal{L}$ on an abelian variety A

§1. Review.

Let k be a fixed algebraically closed field of char$(k)\neq 2$, and let A be a g-

Received February 16, 1987, Revised November 9, 1987.