# 105. *On Prehomogeneous Compact Kähler Manifolds*

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**1.** In this note we establish some results on classification of compact complex prehomogeneous Kähler manifolds. Details will appear elsewhere. By a compact prehomogeneous manifold, we mean a compact complex manifold whose automorphism group has an open orbit. In [4], J. Potters classified prehomogeneous compact complex surfaces. In what follows we shall state a couple of structure theorems on prehomogeneous compact Kähler manifolds and a classification of such manifolds with coirregularity less than 3.

For convenience sake, we list here some notations and terminologies used below. Let $V$ be a compact complex manifold.

$\mathrm{Aut}^{\circ}(V)$ = the connected biholomorphic automorphism group of $V$.

$A(V)$ = the Albanese torus of $V$.

$q(V) = \dim H^1(V, \mathcal{O})$ which is called the irregularity of $V$.

$cq(V) = \dim V - q(V)$ which is called the coirregularity of $V$.

By a regular manifold we mean a compact complex manifold whose irregularity vanishes. For a complex analytic vector bundle $\boldsymbol{E}$ on $V$, we denote by $\boldsymbol{P}(\boldsymbol{E})$ the projective bundle associated with $\boldsymbol{E}$.

**2.** First we state certain general theorems on prehomogeneous manifolds. The following Proposition 1 can be proved by using a lemma due to R. Remmert and van de Ven (see, Potters [4]).

**Proposition 1.** *A compact complex prehomogeneous manifold is a locally trivial analytic fibre bundle over a compact complex solvmanifold whose fibre is prehomogeneous with trivial Albanese torus.*

**Corollary.** *A compact Kähler prehomogeneous manifold $V$ is a holomorphic fibre bundle over its Albanese torus $A(V)$ with a regular prehomogeneous fibre.*

In fact every Kähler solvmanifold is isomorphic to a complex torus.

In what follows we always assume that $V$ is Kähler.

**Proposition 2.** *If $q(V)=0$, then $V$ is a unirational projective variety.*

**Proof.** For the projectivity of $V$, see Oeljekraus [3]. We prove the unirationality. Since $V$ is regular, $V$ can be imbedded into a projective space $\boldsymbol{P}^n$ such that this imbedding induces an inclusion of $G = \mathrm{Aut}^{\circ}(V)$ into $PGL(n)$. This shows that $G$ and its stabilizer subgroup at every point of $V$ are both linear algebraic groups. Since by as-