Ohno, Masahiro

On degenerate secant varieties whose Gauss maps have the largest images. (English)

Zbl 0939.14029
Pac. J. Math. 187, No. 1, 151-175 (1999).

Let X be an n-dimensional nondegenerate projective manifold in $\mathbb{P}^N$ over a field of characteristic zero, Sec X the secant variety of X in $\mathbb{P}^N$. The secant variety is degenerate if dim Sec $X < \min(2n+1, N)$. Then dim Sec $X \geq (3n+2)/2$. If equality holds then X is a Severi variety; these have been classified completely by Zak.

F. L. Zak ["Tangents and secants of algebraic varieties", Transl. Math. Monographs 127 (1993; Zbl 0795.14018)] studied a larger class of manifolds with degenerate secant variety which he called Scorza varieties.

The present author defines a still larger class by studying the Gauss map γ of the smooth part of Sec X and requiring that dim Image$(\gamma) = 2$(dim Sec $X - n - 1)$. Let $\varepsilon = 2$dim Sec $X - 3n - 2$. The author proves many results about these manifolds; among these are that dim Sec $X \leq 2n-2$ implies that X is a Fano manifold. He also determines all possible n for $\varepsilon = 2, 3, 4, 5$, and classifies X in case dim Sec $X = 2n-1$, $n = 6$, and dim Sec $X = 2n-2$, $n = 4, 5$. The proofs need the heavy machinery developed by earlier researchers in this field. The author notes that there is no known example of all these cases that is not a Fano manifold.

Reviewer: H.Guggenheimer (West Hempstead)

MSC:

14N15	Classical problems, Schubert calculus
14M15	Grassmannians, Schubert varieties, flag manifolds

Keywords:

degenerate secant varieties; Severi variety; Gauss map; Fano manifold

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