

Accepted Manuscript

Vector bundles give equations of cactus varieties

Maciej Gałązka

PII: S0024-3795(16)30584-5
DOI: <http://dx.doi.org/10.1016/j.laa.2016.12.005>
Reference: LAA 13963

To appear in: *Linear Algebra and its Applications*

Received date: 19 July 2016
Accepted date: 5 December 2016

Please cite this article in press as: M. Gałązka, Vector bundles give equations of cactus varieties, *Linear Algebra Appl.* (2017), <http://dx.doi.org/10.1016/j.laa.2016.12.005>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Vector bundles give equations of cactus varieties

Maciej Gałazka

Faculty of Mathematics, Computer Science, and Mechanics, University of Warsaw, ul. Banacha 2,
02-097 Warszawa, Poland

Abstract

We prove that vector bundles give equations of cactus varieties. We derive from it that equations coming from vector bundles are not enough to define secant varieties of Veronese varieties in general.

Keywords: secant variety, Waring rank, cactus rank, homogeneous variety, apolarity, catalecticant

2010 MSC: 14N15, 14M17

1. Introduction

Suppose W is a vector space over an algebraically closed field \mathbb{K} . We denote by W^* the dual vector space. Let $X \subseteq \mathbb{P}W$ be a non-degenerate (i.e. not contained in a hyperplane) projective variety over \mathbb{K} . We assume all the sheaves considered on X are coherent \mathcal{O}_X -modules. For $F \in W$ let us define the notion of X -rank.

$$r_X(F) = \min\{r \in \mathbb{Z}_{\geq 0} \mid [F] \in \langle p_1, \dots, p_r \rangle \text{ for some } p_1, \dots, p_r \in X\},$$

where $[F]$ denotes the class of F in the projective space, and $\langle \cdot \rangle$ denotes the (projective) linear span. The r -th secant variety is

$$\begin{aligned} \sigma_r(X) &= \overline{\{[F] \in \mathbb{P}W \mid r_X(F) \leq r\}} \\ &= \overline{\bigcup_{p_1, \dots, p_r \in X} \langle p_1, \dots, p_r \rangle}, \end{aligned}$$

where the overline denotes the Zariski closure. The variety X is often fixed, so we omit X in the X -rank and $r_X(F)$, and simply write rank and $r(F)$.

In this article we investigate the problem of finding set-theoretic equations of $\sigma_r(X)$ and the problem of giving lower bounds for rank. The following proposition, which is given for instance in [1, beginning of Chapter 7], is useful:

Email address: mgalazka@mimuw.edu.pl (Maciej Gałazka)

Download English Version:

<https://daneshyari.com/en/article/5773097>

Download Persian Version:

<https://daneshyari.com/article/5773097>

[Daneshyari.com](https://daneshyari.com)