Cox, David A.; **Materov, Evgeny**

Tate resolutions for Segre embeddings. (English) Zbl 1168.13009

Algebra Number Theory 2, No. 5, 523-550 (2008).

Over a field of characteristic zero, the Tate resolution of a coherent sheaf F over a projective space $\mathbb{P}(W)$ provides an exact sequence $T^*(F)$ of modules where

$$T^p(F) = \bigoplus_i (E(i-p) \otimes H^i(F(p-i))),$$

E being the exterior algebra $E = \bigwedge W$. An effective knowledge of the maps $T^p(F) \to T^{p+1}(F)$ in the sequence is an important tool for detecting properties of F. An interesting application arises when F corresponds to the push-forward of a sheaf in some fundamental map between projective spaces, as the Veronese or the Segre map.

The authors consider the two-factor Segre embedding $\nu : \mathbb{P}^a \times \mathbb{P}^b \to \mathbb{P}^{ab+a+b}$ and the coherent sheaf $F = \nu_* O_{\mathbb{P}^a \times \mathbb{P}^b}(k,l)$. They are able to describe the maps in the Tate resolution, in terms of toric Jacobians or Sylvester forms of sequences of bilinear forms (depending on some relations among the four numbers a, b, k, l). The resulting forms describing the maps, turn out to be similar to some known formulas for hyperdeterminants of three dimensional tensors.

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MSC:

13D02 Syzygies, resolutions, complexes and commutative rings

Keywords:

Segre embedding

Full Text: DOI arXiv Link