

DECOMPOSITION OF TSCHIRNHAUSEN MODULES FOR COVERINGS ON DECOMPOSABLE \mathbb{P}^1 -BUNDLES

ABSTRACT

Let $\varphi : X \rightarrow Y$ be a finite morphism of degree $m \geq 2$, where X and Y are smooth projective algebraic varieties. Such a covering gives rise to the short exact sequence of vector bundles on Y :

$$0 \rightarrow \mathcal{O}_Y \xrightarrow{\varphi^\#} \varphi_* \mathcal{O}_X \rightarrow \mathcal{E}^\vee \rightarrow 0,$$

where \mathcal{E}^\vee is known as the *Tschirnhausen module* of the covering φ .

In the talk, we focus on the case where Y is smooth and X is a smooth m -multisection of the \mathbb{P}^1 -bundle

$$f : \mathbb{P}(\mathcal{O}_Y \oplus \mathcal{O}_Y(E)) \rightarrow Y,$$

with E an effective divisor on Y such that $H^1(Y, \mathcal{O}_Y(kE)) = 0$ for all $k = 1, \dots, m-1$. We show that the Tschirnhausen module of the induced covering $f|_X : X \rightarrow Y$ is completely decomposable, after which we discuss applications of this result.

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