

Classification of twisted algebras of 3-dimensional Sklyanin algebras

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The notion of twisting system was introduced by Zhang [3]. A twisting system is called algebraic if it is given by some graded algebra automorphism. One of the main applications of a twisting system is that the graded module category of twisted algebra is equivalent to that of the original graded algebra. Although a twisting system is useful, it is often difficult to construct non-algebraic twisting systems even if a graded algebra is given by explicit generators and defining relations. A geometric algebra $A = \mathcal{A}(E, \sigma)$ introduced by Mori [2] is a quadratic algebra which determines and is determined by the pair (E, σ) where E is a projective scheme and $\sigma \in \text{Aut}_k E$. A 3-dimensional Sklyanin algebra is a geometric algebra $A = \mathcal{A}(E, \sigma)$ where E is an elliptic curve in the projective plane \mathbb{P}^2 and σ is a translation by some point of E . One of our main results is that we provide a geometric condition about whether a twisting system on A is algebraic. Using this condition, we can construct a lot of non-algebraic twisting systems on A . As an application, we classify twisted algebras of 3-dimensional Sklyanin algebras up to graded algebra isomorphism.

References

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