

Classification of Cubic Surfaces with Twenty-seven Lines Over the Finite Field of 13 Elements

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We introduce a geometric procedure for the classification of cubic surfaces with twenty-seven lines over the finite fields $GF(q)$ of characteristic other than two. The construction is based on the 6-arcs not on a conic in $PG(2, q)$ and the configuration of E -points of the cubic surfaces.

The performance of the algorithm is illustrated by the example of cubic surfaces over the finite field with thirteen elements. It was discovered that there are five distinct equivalence classes of cubic surfaces with twenty-seven lines in $PG(3, 13)$.

MSC2000: 05B25.

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