Rank-74264 over GF(8)

January 15, 2021

The equation

The equation of the surface is :

$$X_0^3 + X_2^3 + X_0^2 X_1 + X_1^2 X_3 + X_0 X_3^2 + X_0 X_1 X_2 = 0$$

(1, 0, 1, 0, 1, 0, 0, 0, 0, 1, 0, 0, 0, 1, 0, 0, 1, 0, 0, 0)
The point rank of the equation over GF(8) is 1361355406

General information

Number of lines	1
Number of points	57
Number of singular points	0
Number of Eckardt points	0
Number of double points	0
Number of single points	9
Number of points off lines	48
Number of Hesse planes	0
Number of axes	0
Type of points on lines	9
Type of lines on points	$1^9, 0^{48}$

Singular Points

The surface has 0 singular points:

The 1 Lines

The lines and their Pluecker coordinates are:

$$\ell_0 = \begin{bmatrix} 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 \end{bmatrix}_{73} = \begin{bmatrix} 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 \end{bmatrix}_{73} = \mathbf{Pl}(1,0,0,0,0,1)_{650}$$

Rank of lines: (73)
Rank of points on Klein quadric: (650)

Eckardt Points

The surface has 0 Eckardt points:

Double Points

The surface has 0 Double points:
The double points on the surface are:

Single Points

The surface has 9 single points:
The single points on the surface are:

$0 : P_1 = (0, 1, 0, 0)$ lies on line ℓ_0

$1 : P_{12} = (1, 0, 1, 0)$ lies on line ℓ_0

$2 : P_{20} = (1, 1, 1, 0)$ lies on line ℓ_0

$3 : P_{28} = (1, 2, 1, 0)$ lies on line ℓ_0

$4 : P_{36} = (1, 3, 1, 0)$ lies on line ℓ_0

$5 : P_{44} = (1, 4, 1, 0)$ lies on line ℓ_0

$6 : P_{52} = (1, 5, 1, 0)$ lies on line ℓ_0

$7 : P_{60} = (1, 6, 1, 0)$ lies on line ℓ_0

$8 : P_{68} = (1, 7, 1, 0)$ lies on line ℓ_0

The single points on the surface are:

Points on surface but on no line

The surface has 48 points not on any line:
The points on the surface but not on lines are:

$0 : P_3 = (0, 0, 0, 1)$

$1 : P_4 = (1, 1, 1, 1)$

$2 : P_5 = (1, 1, 0, 0)$

$3 : P_{40} = (5, 3, 1, 0)$

$4 : P_{42} = (7, 3, 1, 0)$

$5 : P_{53} = (2, 5, 1, 0)$

$6 : P_{57} = (6, 5, 1, 0)$

$7 : P_{62} = (3, 6, 1, 0)$

$8 : P_{63} = (4, 6, 1, 0)$

$9 : P_{75} = (1, 0, 0, 1)$

$10 : P_{83} = (1, 1, 0, 1)$

$11 : P_{141} = (3, 0, 1, 1)$

$12 : P_{143} = (5, 0, 1, 1)$

$13 : P_{144} = (6, 0, 1, 1)$

$14 : P_{146} = (0, 1, 1, 1)$

$15 : P_{166} = (5, 3, 1, 1)$

$16 : P_{183} = (6, 5, 1, 1)$

$17 : P_{188} = (3, 6, 1, 1)$

$18 : P_{225} = (0, 3, 2, 1)$

$19 : P_{244} = (3, 5, 2, 1)$

$20 : P_{252} = (3, 6, 2, 1)$

$21 : P_{259} = (2, 7, 2, 1)$

$22 : P_{269} = (4, 0, 3, 1)$

$23 : P_{298} = (1, 4, 3, 1)$

$24 : P_{314} = (1, 6, 3, 1)$

$25 : P_{316} = (3, 6, 3, 1)$

$26 : P_{317} = (4, 6, 3, 1)$

$27 : P_{321} = (0, 7, 3, 1)$

$28 : P_{349} = (4, 2, 4, 1)$

$29 : P_{358} = (5, 3, 4, 1)$

$30 : P_{369} = (0, 5, 4, 1)$

$31 : P_{382} = (5, 6, 4, 1)$

$32 : P_{400} = (7, 0, 5, 1)$

$33 : P_{409} = (0, 2, 5, 1)$

$34 : P_{418} = (1, 3, 5, 1)$

$35 : P_{422} = (5, 3, 5, 1)$

$36 : P_{424} = (7, 3, 5, 1)$

$37 : P_{450} = (1, 7, 5, 1)$

$38 : P_{459} = (2, 0, 6, 1)$

$39 : P_{474} = (1, 2, 6, 1)$

$40 : P_{489} = (0, 4, 6, 1)$

$41 : P_{498} = (1, 5, 6, 1)$

$42 : P_{499} = (2, 5, 6, 1)$

$43 : P_{503} = (6, 5, 6, 1)$

$44 : P_{551} = (6, 3, 7, 1)$
$45 : P_{560} = (7, 4, 7, 1)$
$46 : P_{567} = (6, 5, 7, 1)$

$47 : P_{569} = (0, 6, 7, 1)$

Line Intersection Graph

	0
0	0

Neighbor sets in the line intersection graph:
Line 0 intersects

Line
in point

The surface has 57 points:
The points on the surface are:

$0 : P_1 = (0, 1, 0, 0)$
$1 : P_3 = (0, 0, 0, 1)$
$2 : P_4 = (1, 1, 1, 1)$
$3 : P_5 = (1, 1, 0, 0)$
$4 : P_{12} = (1, 0, 1, 0)$
$5 : P_{20} = (1, 1, 1, 0)$
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