Rank-74279 over GF(8)

January 15, 2021

The equation

The equation of the surface is :

$$X_2^3 + X_0^2X_2 + X_1^2X_3 + X_0X_3^2 + X_0X_1X_2 = 0$$

(0, 0, 1, 0, 0, 1, 0, 0, 0, 1, 0, 0, 0, 1, 0, 0, 1, 0, 0, 0)
The point rank of the equation over GF(8) is 1361384077

General information

Number of lines	1
Number of points	73
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	64
Number of Hesse planes	0
Number of axes	0
Type of points on lines	9
Type of lines on points	1^9, 0^{64}

Singular Points

The surface has 0 singular points:

The 1 Lines

The lines and their Pluecker coordinates are:

$$\ell_0 = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \end{bmatrix}_0 = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \end{bmatrix}_0 = \mathbf{Pl}(1,0,0,0,0,0)_0$$

Rank of lines: (0)
Rank of points on Klein quadric: (0)

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:

$0: P_0 = (1,0,0,0)$ lies on line ℓ_0
$1: P_1 = (0,1,0,0)$ lies on line ℓ_0
$2: P_5 = (1,1,0,0)$ lies on line ℓ_0
$3: P_6 = (2,1,0,0)$ lies on line ℓ_0
$4: P_7 = (3,1,0,0)$ lies on line ℓ_0
$5: P_8 = (4,1,0,0)$ lies on line ℓ_0
$6: P_9 = (5,1,0,0)$ lies on line ℓ_0
$7: P_{10} = (6,1,0,0)$ lies on line ℓ_0
$8: P_{11} = (7,1,0,0)$ lies on line ℓ_0

The single points on the surface are:

Points on surface but on no line

The surface has 64 points not on any line:
The points on the surface but not on lines are:

$0: P_3 = (0,0,0,1)$
$1: P_{12} = (1,0,1,0)$
$2: P_{32} = (5,2,1,0)$
$3: P_{34} = (7,2,1,0)$
$4: P_{45} = (2,4,1,0)$
$5: P_{49} = (6,4,1,0)$
$6: P_{70} = (3,7,1,0)$
$7: P_{71} = (4,7,1,0)$
$8: P_{83} = (1,1,0,1)$
$9: P_{94} = (4,2,0,1)$
$10: P_{103} = (5,3,0,1)$
$11: P_{113} = (7,4,0,1)$
$12: P_{120} = (6,5,0,1)$
$13: P_{125} = (3,6,0,1)$
$14: P_{132} = (2,7,0,1)$
$15: P_{146} = (0,1,1,1)$
$16: P_{225} = (0,3,2,1)$
$17: P_{230} = (5,3,2,1)$
$18: P_{238} = (5,4,2,1)$
$19: P_{240} = (7,4,2,1)$
$20: P_{255} = (6,6,2,1)$
$21: P_{263} = (6,7,2,1)$
$22: P_{264} = (7,7,2,1)$
$23: P_{266} = (1,0,3,1)$
$24: P_{270} = (5,0,3,1)$
$25: P_{284} = (3,2,3,1)$
$26: P_{286} = (5,2,3,1)$
$27: P_{290} = (1,3,3,1)$
$28: P_{295} = (6,3,3,1)$
$29: P_{303} = (6,4,3,1)$
$30: P_{321} = (0,7,3,1)$
$31: P_{324} = (3,7,3,1)$
$32: P_{347} = (2,2,4,1)$
$33: P_{348} = (3,2,4,1)$
$34: P_{356} = (3,3,4,1)$
$35: P_{369} = (0,5,4,1)$
$36: P_{375} = (6,5,4,1)$
$37: P_{387} = (2,7,4,1)$
$38: P_{391} = (6,7,4,1)$
$39: P_{394} = (1,0,5,1)$
$40: P_{399} = (6,0,5,1)$
$41: P_{409} = (0,2,5,1)$
$42: P_{414} = (5,2,5,1)$
$43: P_{430} = (5,4,5,1)$

44 : $P_{431} = (6, 4, 5, 1)$
45 : $P_{434} = (1, 5, 5, 1)$
46 : $P_{436} = (3, 5, 5, 1)$
47 : $P_{452} = (3, 7, 5, 1)$
48 : $P_{458} = (1, 0, 6, 1)$
49 : $P_{460} = (3, 0, 6, 1)$
50 : $P_{478} = (5, 2, 6, 1)$
51 : $P_{489} = (0, 4, 6, 1)$
52 : $P_{495} = (6, 4, 6, 1)$
53 : $P_{506} = (1, 6, 6, 1)$
54 : $P_{510} = (5, 6, 6, 1)$
55 : $P_{516} = (3, 7, 6, 1)$
56 : $P_{519} = (6, 7, 6, 1)$
57 : $P_{540} = (3, 2, 7, 1)$
58 : $P_{541} = (4, 2, 7, 1)$
59 : $P_{557} = (4, 4, 7, 1)$
60 : $P_{558} = (5, 4, 7, 1)$
61 : $P_{566} = (5, 5, 7, 1)$
62 : $P_{569} = (0, 6, 7, 1)$
63 : $P_{572} = (3, 6, 7, 1)$

Line Intersection Graph

	0
0	0

Neighbor sets in the line intersection graph:
Line 0 intersects

Line
in point

The surface has 73 points:
The points on the surface are:

0 : $P_{0} = (1, 0, 0, 0)$
1 : $P_{1} = (0, 1, 0, 0)$
2 : $P_{3} = (0, 0, 0, 1)$
3 : $P_{5} = (1, 1, 0, 0)$
4 : $P_{6} = (2, 1, 0, 0)$
5 : $P_{7} = (3, 1, 0, 0)$
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