Rank-265 over GF(8)

January 15, 2021

The equation

The equation of the surface is :

$$X_0^3 + X_2^3 + X_3^3 + X_0^2X_1 + X_0^2X_2 + X_0^2X_3 + X_0X_1^2 = 0$$

(1, 0, 1, 1, 1, 1, 1, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0)
The point rank of the equation over GF(8) is 599191

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:

$$\ell_0 = \begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 \end{bmatrix}_{4673} = \begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 \end{bmatrix}_{4673} = \mathbf{Pl}(0,0,0,1,0,1)_{769}$$

Rank of lines: (4673)
Rank of points on Klein quadric: (769)

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
$1:\ P_{138} = (0,0,1,1)$ lies on line ℓ_0
$2:\ P_{146} = (0,1,1,1)$ lies on line ℓ_0
$3:\ P_{153} = (0,2,1,1)$ lies on line ℓ_0
$4:\ P_{161} = (0,3,1,1)$ lies on line ℓ_0
$5:\ P_{169} = (0,4,1,1)$ lies on line ℓ_0
$6:\ P_{177} = (0,5,1,1)$ lies on line ℓ_0
$7:\ P_{185} = (0,6,1,1)$ lies on line ℓ_0
$8:\ P_{193} = (0,7,1,1)$ 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:

$0:\ P_{13} = (2,0,1,0)$
$1:\ P_{15} = (4,0,1,0)$
$2:\ P_{18} = (7,0,1,0)$
$3:\ P_{22} = (3,1,1,0)$
$4:\ P_{24} = (5,1,1,0)$
$5:\ P_{25} = (6,1,1,0)$
$6:\ P_{29} = (2,2,1,0)$
$7:\ P_{30} = (3,2,1,0)$
$8:\ P_{47} = (4,4,1,0)$
$9:\ P_{48} = (5,4,1,0)$
$10:\ P_{73} = (6,7,1,0)$
$11:\ P_{74} = (7,7,1,0)$
$12:\ P_{76} = (2,0,0,1)$
$13:\ P_{78} = (4,0,0,1)$
$14:\ P_{81} = (7,0,0,1)$
$15:\ P_{85} = (3,1,0,1)$
$16:\ P_{87} = (5,1,0,1)$
$17:\ P_{88} = (6,1,0,1)$
$18:\ P_{92} = (2,2,0,1)$
$19:\ P_{93} = (3,2,0,1)$
$20:\ P_{110} = (4,4,0,1)$
$21:\ P_{111} = (5,4,0,1)$
$22:\ P_{136} = (6,7,0,1)$
$23:\ P_{137} = (7,7,0,1)$
$24:\ P_{203} = (2,0,2,1)$
$25:\ P_{218} = (1,2,2,1)$
$26:\ P_{219} = (2,2,2,1)$
$27:\ P_{226} = (1,3,2,1)$
$28:\ P_{266} = (1,0,3,1)$
$29:\ P_{274} = (1,1,3,1)$
$30:\ P_{276} = (3,1,3,1)$
$31:\ P_{284} = (3,2,3,1)$
$32:\ P_{333} = (4,0,4,1)$
$33:\ P_{362} = (1,4,4,1)$
$34:\ P_{365} = (4,4,4,1)$
$35:\ P_{370} = (1,5,4,1)$
$36:\ P_{394} = (1,0,5,1)$
$37:\ P_{402} = (1,1,5,1)$
$38:\ P_{406} = (5,1,5,1)$
$39:\ P_{430} = (5,4,5,1)$
$40:\ P_{458} = (1,0,6,1)$
$41:\ P_{466} = (1,1,6,1)$
$42:\ P_{471} = (6,1,6,1)$
$43:\ P_{519} = (6,7,6,1)$

44 : $P_{528} = (7, 0, 7, 1)$
45 : $P_{570} = (1, 6, 7, 1)$
46 : $P_{578} = (1, 7, 7, 1)$
47 : $P_{584} = (7, 7, 7, 1)$

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 : $P_{13} = (2, 0, 1, 0)$
2 : $P_{15} = (4, 0, 1, 0)$
3 : $P_{18} = (7, 0, 1, 0)$
4 : $P_{22} = (3, 1, 1, 0)$
5 : $P_{24} = (5, 1, 1, 0)$
6 : $P_{25} = (6, 1, 1, 0)$
7 : $P_{29} = (2, 2, 1, 0)$
8 : $P_{30} = (3, 2, 1, 0)$
9 : $P_{47} = (4, 4, 1, 0)$
10 : $P_{48} = (5, 4, 1, 0)$
11 : $P_{73} = (6, 7, 1, 0)$
12 : $P_{74} = (7, 7, 1, 0)$
13 : $P_{76} = (2, 0, 0, 1)$
14 : $P_{78} = (4, 0, 0, 1)$
15 : $P_{81} = (7, 0, 0, 1)$
16 : $P_{85} = (3, 1, 0, 1)$
17 : $P_{87} = (5, 1, 0, 1)$
18 : $P_{88} = (6, 1, 0, 1)$
19 : $P_{92} = (2, 2, 0, 1)$
20 : $P_{93} = (3, 2, 0, 1)$
21 : $P_{110} = (4, 4, 0, 1)$
22 : $P_{111} = (5, 4, 0, 1)$
23 : $P_{136} = (6, 7, 0, 1)$
24 : $P_{137} = (7, 7, 0, 1)$
25 : $P_{138} = (0, 0, 1, 1)$
26 : $P_{146} = (0, 1, 1, 1)$
27 : $P_{153} = (0, 2, 1, 1)$
28 : $P_{161} = (0, 3, 1, 1)$
29 : $P_{169} = (0, 4, 1, 1)$
30 : $P_{177} = (0, 5, 1, 1)$
31 : $P_{185} = (0, 6, 1, 1)$
32 : $P_{193} = (0, 7, 1, 1)$
33 : $P_{203} = (2, 0, 2, 1)$
34 : $P_{218} = (1, 2, 2, 1)$
35 : $P_{219} = (2, 2, 2, 1)$
36 : $P_{226} = (1, 3, 2, 1)$
37 : $P_{266} = (1, 0, 3, 1)$
38 : $P_{274} = (1, 1, 3, 1)$
39 : $P_{276} = (3, 1, 3, 1)$
40 : $P_{284} = (3, 2, 3, 1)$
41 : $P_{333} = (4, 0, 4, 1)$
42 : $P_{362} = (1, 4, 4, 1)$
43 : $P_{365} = (4, 4, 4, 1)$
44 : $P_{370} = (1, 5, 4, 1)$
45 : $P_{394} = (1, 0, 5, 1)$
46 : $P_{402} = (1, 1, 5, 1)$
47 : $P_{406} = (5, 1, 5, 1)$
48 : $P_{430} = (5, 4, 5, 1)$
49 : $P_{458} = (1, 0, 6, 1)$
50 : $P_{466} = (1, 1, 6, 1)$
51 : $P_{471} = (6, 1, 6, 1)$
52 : $P_{519} = (6, 7, 6, 1)$
53 : $P_{528} = (7, 0, 7, 1)$
54 : $P_{570} = (1, 6, 7, 1)$
55 : $P_{578} = (1, 7, 7, 1)$
56 : $P_{584} = (7, 7, 7, 1)$