Rank-65874 over GF(8)

January 15, 2021

The equation

The equation of the surface is :

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

(1, 1, 1, 1, 0, 0, 1, 0, 1, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0)
The point rank of the equation over GF(8) is 1244173462

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:

$$\ell_0 = \begin{bmatrix} 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & 1 \end{bmatrix}_{666} = \begin{bmatrix} 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & 1 \end{bmatrix}_{666} = \mathbf{Pl}(1,0,1,1,1,1)_{1323}$$

Rank of lines: (666)
Rank of points on Klein quadric: (1323)

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 : $P_5 = (1,1,0,0)$ lies on line ℓ_0
1 : $P_{139} = (1,0,1,1)$ lies on line ℓ_0
2 : $P_{146} = (0,1,1,1)$ lies on line ℓ_0
3 : $P_{156} = (3,2,1,1)$ lies on line ℓ_0
4 : $P_{163} = (2,3,1,1)$ lies on line ℓ_0
5 : $P_{174} = (5,4,1,1)$ lies on line ℓ_0
6 : $P_{181} = (4,5,1,1)$ lies on line ℓ_0
7 : $P_{192} = (7,6,1,1)$ lies on line ℓ_0
8 : $P_{199} = (6,7,1,1)$ lies on line ℓ_0

The single points on the surface are:

Points on surface but on no line

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

0 : $P_{12} = (1,0,1,0)$
1 : $P_{22} = (3,1,1,0)$
2 : $P_{24} = (5,1,1,0)$
3 : $P_{25} = (6,1,1,0)$
4 : $P_{27} = (0,2,1,0)$
5 : $P_{34} = (7,2,1,0)$
6 : $P_{40} = (5,3,1,0)$
7 : $P_{43} = (0,4,1,0)$
8 : $P_{45} = (2,4,1,0)$
9 : $P_{57} = (6,5,1,0)$
10 : $P_{62} = (3,6,1,0)$
11 : $P_{67} = (0,7,1,0)$
12 : $P_{71} = (4,7,1,0)$
13 : $P_{76} = (2,0,0,1)$
14 : $P_{78} = (4,0,0,1)$
15 : $P_{81} = (7,0,0,1)$
16 : $P_{82} = (0,1,0,1)$
17 : $P_{83} = (1,1,0,1)$
18 : $P_{96} = (6,2,0,1)$
19 : $P_{109} = (3,4,0,1)$
20 : $P_{135} = (5,7,0,1)$
21 : $P_{138} = (0,0,1,1)$
22 : $P_{207} = (6,0,2,1)$
23 : $P_{218} = (1,2,2,1)$
24 : $P_{219} = (2,2,2,1)$
25 : $P_{247} = (6,5,2,1)$
26 : $P_{253} = (4,6,2,1)$
27 : $P_{258} = (1,7,2,1)$
28 : $P_{263} = (6,7,2,1)$
29 : $P_{287} = (6,2,3,1)$
30 : $P_{298} = (1,4,3,1)$
31 : $P_{305} = (0,5,3,1)$
32 : $P_{319} = (6,6,3,1)$
33 : $P_{324} = (3,7,3,1)$
34 : $P_{325} = (4,7,3,1)$
35 : $P_{327} = (6,7,3,1)$
36 : $P_{332} = (3,0,4,1)$
37 : $P_{346} = (1,2,4,1)$
38 : $P_{348} = (3,2,4,1)$
39 : $P_{360} = (7,3,4,1)$
40 : $P_{362} = (1,4,4,1)$
41 : $P_{365} = (4,4,4,1)$
42 : $P_{380} = (3,6,4,1)$
43 : $P_{412} = (3,2,5,1)$

44 : $P_{414} = (5, 2, 5, 1)$
45 : $P_{416} = (7, 2, 5, 1)$
46 : $P_{420} = (3, 3, 5, 1)$
47 : $P_{428} = (3, 4, 5, 1)$
48 : $P_{441} = (0, 6, 5, 1)$
49 : $P_{450} = (1, 7, 5, 1)$
50 : $P_{474} = (1, 2, 6, 1)$
51 : $P_{481} = (0, 3, 6, 1)$
52 : $P_{491} = (2, 4, 6, 1)$
53 : $P_{494} = (5, 4, 6, 1)$
54 : $P_{495} = (6, 4, 6, 1)$
55 : $P_{502} = (5, 5, 6, 1)$
56 : $P_{518} = (5, 7, 6, 1)$
57 : $P_{526} = (5, 0, 7, 1)$
58 : $P_{550} = (5, 3, 7, 1)$
59 : $P_{554} = (1, 4, 7, 1)$
60 : $P_{558} = (5, 4, 7, 1)$
61 : $P_{563} = (2, 5, 7, 1)$
62 : $P_{578} = (1, 7, 7, 1)$
63 : $P_{584} = (7, 7, 7, 1)$

Line Intersection Graph

	0
0	0

Neighbor sets in the line intersection graph:
Line 0 intersects

Line
in point

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

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