Rank-76356 over GF(8)

January 15, 2021

The equation

The equation of the surface is :

$$X_0^3 + X_0^2X_3 + X_1^2X_3 + X_1X_2^2 + X_0X_3^2 + X_0X_1X_2 = 0$$

(1, 0, 0, 0, 0, 0, 1, 0, 0, 1, 0, 1, 0, 1, 0, 0, 1, 0, 0, 0)
The point rank of the equation over GF(8) is 1361613390

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:

$$\ell_0 = \begin{bmatrix} 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}_{4744} = \begin{bmatrix} 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}_{4744} = \mathbf{Pl}(0,1,0,0,0,0)_1$$

Rank of lines: (4744)
Rank of points on Klein quadric: (1)

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:

$0: P_2 = (0,0,1,0)$ lies on line ℓ_0
$1: P_3 = (0,0,0,1)$ lies on line ℓ_0
$2: P_{138} = (0,0,1,1)$ lies on line ℓ_0
$3: P_{201} = (0,0,2,1)$ lies on line ℓ_0
$4: P_{265} = (0,0,3,1)$ lies on line ℓ_0
$5: P_{329} = (0,0,4,1)$ lies on line ℓ_0
$6: P_{393} = (0,0,5,1)$ lies on line ℓ_0
$7: P_{457} = (0,0,6,1)$ lies on line ℓ_0
$8: P_{521} = (0,0,7,1)$ 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:

$0: P_1 = (0,1,0,0)$
$1: P_4 = (1,1,1,1)$
$2: P_{22} = (3,1,1,0)$
$3: P_{24} = (5,1,1,0)$
$4: P_{25} = (6,1,1,0)$
$5: P_{37} = (2,3,1,0)$
$6: P_{55} = (4,5,1,0)$
$7: P_{66} = (7,6,1,0)$
$8: P_{83} = (1,1,0,1)$
$9: P_{93} = (3,2,0,1)$
$10: P_{102} = (4,3,0,1)$
$11: P_{111} = (5,4,0,1)$
$12: P_{121} = (7,5,0,1)$
$13: P_{124} = (2,6,0,1)$
$14: P_{136} = (6,7,0,1)$
$15: P_{146} = (0,1,1,1)$
$16: P_{216} = (7,1,2,1)$
$17: P_{233} = (0,4,2,1)$
$18: P_{251} = (2,6,2,1)$
$19: P_{253} = (4,6,2,1)$
$20: P_{256} = (7,6,2,1)$
$21: P_{261} = (4,7,2,1)$
$22: P_{277} = (4,1,3,1)$
$23: P_{284} = (3,2,3,1)$
$24: P_{286} = (5,2,3,1)$
$25: P_{288} = (7,2,3,1)$
$26: P_{296} = (7,3,3,1)$
$27: P_{303} = (6,4,3,1)$
$28: P_{305} = (0,5,3,1)$
$29: P_{309} = (4,5,3,1)$
$30: P_{310} = (5,5,3,1)$
$31: P_{319} = (6,6,3,1)$
$32: P_{339} = (2,1,4,1)$
$33: P_{352} = (7,2,4,1)$
$34: P_{355} = (2,3,4,1)$
$35: P_{357} = (4,3,4,1)$
$36: P_{360} = (7,3,4,1)$
$37: P_{385} = (0,7,4,1)$
$38: P_{408} = (7,1,5,1)$
$39: P_{420} = (3,3,5,1)$
$40: P_{427} = (2,4,5,1)$
$41: P_{430} = (5,4,5,1)$
$42: P_{431} = (6,4,5,1)$
$43: P_{435} = (2,5,5,1)$

44 : $P_{441} = (0, 6, 5, 1)$
45 : $P_{447} = (6, 6, 5, 1)$
46 : $P_{448} = (7, 6, 5, 1)$
47 : $P_{452} = (3, 7, 5, 1)$
48 : $P_{467} = (2, 1, 6, 1)$
49 : $P_{478} = (5, 2, 6, 1)$
50 : $P_{481} = (0, 3, 6, 1)$
51 : $P_{483} = (2, 3, 6, 1)$
52 : $P_{484} = (3, 3, 6, 1)$
53 : $P_{502} = (5, 5, 6, 1)$
54 : $P_{509} = (4, 6, 6, 1)$
55 : $P_{516} = (3, 7, 6, 1)$
56 : $P_{517} = (4, 7, 6, 1)$
57 : $P_{519} = (6, 7, 6, 1)$
58 : $P_{533} = (4, 1, 7, 1)$
59 : $P_{537} = (0, 2, 7, 1)$
60 : $P_{555} = (2, 4, 7, 1)$
61 : $P_{563} = (2, 5, 7, 1)$
62 : $P_{565} = (4, 5, 7, 1)$
63 : $P_{568} = (7, 5, 7, 1)$

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 : $P_{1} = (0, 1, 0, 0)$
1 : $P_{2} = (0, 0, 1, 0)$
2 : $P_{3} = (0, 0, 0, 1)$
3 : $P_{4} = (1, 1, 1, 1)$
4 : $P_{22} = (3, 1, 1, 0)$
5 : $P_{24} = (5, 1, 1, 0)$
6 : $P_{25} = (6, 1, 1, 0)$
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14 : $P_{121} = (7, 5, 0, 1)$
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