Rank-73753 over GF(8)

January 15, 2021

The equation

The equation of the surface is :

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

(0, 1, 1, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 1, 0, 0, 0)
The point rank of the equation over GF(8) is 1227137685

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:

$$\ell_0 = \left[\begin{array}{cccc} 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{array}\right]_{4689} = \left[\begin{array}{cccc} 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{array}\right]_{4689} = \mathbf{Pl}(0,1,0,1,0,0)_{25}$$

Rank of lines: (4689)
Rank of points on Klein quadric: (25)

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:

$0: P_3 = (0,0,0,1)$ lies on line ℓ_0
$1: P_{19} = (0,1,1,0)$ lies on line ℓ_0
$2: P_{146} = (0,1,1,1)$ lies on line ℓ_0
$3: P_{217} = (0,2,2,1)$ lies on line ℓ_0
$4: P_{289} = (0,3,3,1)$ lies on line ℓ_0
$5: P_{361} = (0,4,4,1)$ lies on line ℓ_0
$6: P_{433} = (0,5,5,1)$ lies on line ℓ_0
$7: P_{505} = (0,6,6,1)$ lies on line ℓ_0
$8: P_{577} = (0,7,7,1)$ 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:

$0: P_0 = (1,0,0,0)$
$1: P_5 = (1,1,0,0)$
$2: P_{20} = (1,1,1,0)$
$3: P_{99} = (1,3,0,1)$
$4: P_{103} = (5,3,0,1)$
$5: P_{115} = (1,5,0,1)$
$6: P_{120} = (6,5,0,1)$
$7: P_{123} = (1,6,0,1)$
$8: P_{125} = (3,6,0,1)$
$9: P_{139} = (1,0,1,1)$
$10: P_{206} = (5,0,2,1)$
$11: P_{214} = (5,1,2,1)$
$12: P_{215} = (6,1,2,1)$
$13: P_{221} = (4,2,2,1)$
$14: P_{239} = (6,4,2,1)$
$15: P_{240} = (7,4,2,1)$
$16: P_{244} = (3,5,2,1)$
$17: P_{247} = (6,5,2,1)$
$18: P_{251} = (2,6,2,1)$
$19: P_{267} = (2,0,3,1)$
$20: P_{274} = (1,1,3,1)$
$21: P_{276} = (3,1,3,1)$
$22: P_{296} = (7,3,3,1)$
$23: P_{298} = (1,4,3,1)$
$24: P_{306} = (1,5,3,1)$
$25: P_{310} = (5,5,3,1)$
$26: P_{323} = (2,7,3,1)$
$27: P_{325} = (4,7,3,1)$
$28: P_{335} = (6,0,4,1)$
$29: P_{340} = (3,1,4,1)$
$30: P_{343} = (6,1,4,1)$
$31: P_{357} = (4,3,4,1)$
$32: P_{368} = (7,4,4,1)$
$33: P_{380} = (3,6,4,1)$
$34: P_{382} = (5,6,4,1)$
$35: P_{387} = (2,7,4,1)$
$36: P_{388} = (3,7,4,1)$
$37: P_{397} = (4,0,5,1)$
$38: P_{402} = (1,1,5,1)$
$39: P_{406} = (5,1,5,1)$
$40: P_{413} = (4,2,5,1)$
$41: P_{416} = (7,2,5,1)$
$42: P_{435} = (2,5,5,1)$
$43: P_{442} = (1,6,5,1)$

44 : $P_{447} = (6, 6, 5, 1)$
45 : $P_{450} = (1, 7, 5, 1)$
46 : $P_{464} = (7, 0, 6, 1)$
47 : $P_{466} = (1, 1, 6, 1)$
48 : $P_{471} = (6, 1, 6, 1)$
49 : $P_{474} = (1, 2, 6, 1)$
50 : $P_{482} = (1, 3, 6, 1)$
51 : $P_{484} = (3, 3, 6, 1)$
52 : $P_{491} = (2, 4, 6, 1)$
53 : $P_{496} = (7, 4, 6, 1)$
54 : $P_{509} = (4, 6, 6, 1)$
55 : $P_{524} = (3, 0, 7, 1)$
56 : $P_{532} = (3, 1, 7, 1)$
57 : $P_{534} = (5, 1, 7, 1)$
58 : $P_{541} = (4, 2, 7, 1)$
59 : $P_{542} = (5, 2, 7, 1)$
60 : $P_{550} = (5, 3, 7, 1)$
61 : $P_{551} = (6, 3, 7, 1)$
62 : $P_{568} = (7, 5, 7, 1)$
63 : $P_{579} = (2, 7, 7, 1)$

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:

0 : $P_{0} = (1, 0, 0, 0)$
1 : $P_{3} = (0, 0, 0, 1)$
2 : $P_{5} = (1, 1, 0, 0)$
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5 : $P_{99} = (1, 3, 0, 1)$
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