Rank-34 over GF(32)

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The equation

The equation of the surface is :

$$X_0^3 + X_1^3 + X_0^2 X_1 = 0$$

(1, 1, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0)
The point rank of the equation over GF(32) is 33874

General information

Number of lines	1
Number of points	33
Number of singular points	33
Number of Eckardt points	0
Number of double points	0
Number of single points	33
Number of points off lines	0
Number of Hesse planes	0
Number of axes	0
Type of points on lines	33
Type of lines on points	1^{33}

Singular Points

The surface has 33 singular points:

0 : $P_2 = \mathbf{P}(0,0,1,0) = \mathbf{P}(0,0,1,0)$
1 : $P_3 = \mathbf{P}(0,0,0,1) = \mathbf{P}(0,0,0,1)$
2 : $P_{2082} = \mathbf{P}(0,0,1,1) = \mathbf{P}(0,0,1,1)$
3 : $P_{3105} = \mathbf{P}(0,0,\eta,1) = \mathbf{P}(0,0,2,1)$
4 : $P_{4129} = \mathbf{P}(0,0,\eta^{18},1) = \mathbf{P}(0,0,3,1)$
5 : $P_{5153} = \mathbf{P}(0,0,\eta^{2},1) = \mathbf{P}(0,0,4,1)$
6 : $P_{6177} = \mathbf{P}(0,0,\eta^{5},1) = \mathbf{P}(0,0,5,1)$
7 : $P_{7201} = \mathbf{P}(0,0,\eta^{19},1) = \mathbf{P}(0,0,6,1)$
8 : $P_{8225} = \mathbf{P}(0,0,\eta^{11},1) = \mathbf{P}(0,0,7,1)$
9 : $P_{9249} = \mathbf{P}(0,0,\eta^{3},1) = \mathbf{P}(0,0,8,1)$
10 : $P_{10273} = \mathbf{P}(0,0,\eta^{29},1) = \mathbf{P}(0,0,9,1)$
11 : $P_{11297} = \mathbf{P}(0,0,\eta^{6},1) = \mathbf{P}(0,0,10,1)$
12 : $P_{12321} = \mathbf{P}(0,0,\eta^{27},1) = \mathbf{P}(0,0,11,1)$
13 : $P_{13345} = \mathbf{P}(0,0,\eta^{20},1) = \mathbf{P}(0,0,12,1)$
14 : $P_{14369} = \mathbf{P}(0,0,\eta^{8},1) = \mathbf{P}(0,0,13,1)$
15 : $P_{15393} = \mathbf{P}(0,0,\eta^{12},1) = \mathbf{P}(0,0,14,1)$
16 : $P_{16417} = \mathbf{P}(0,0,\eta^{23},1) = \mathbf{P}(0,0,15,1)$
17 : $P_{17441} = \mathbf{P}(0,0,\eta^{4},1) = \mathbf{P}(0,0,16,1)$

$18: P_{18465} = \mathbf{P}(0,0,\eta^{10},1) = \mathbf{P}(0,0,17,1)$
$19: P_{19489} = \mathbf{P}(0,0,\eta^{30},1) = \mathbf{P}(0,0,18,1)$
$20: P_{20513} = \mathbf{P}(0,0,\eta^{17},1) = \mathbf{P}(0,0,19,1)$
$21: P_{21537} = \mathbf{P}(0,0,\eta^{7},1) = \mathbf{P}(0,0,20,1)$
$22: P_{22561} = \mathbf{P}(0,0,\eta^{22},1) = \mathbf{P}(0,0,21,1)$
$23: P_{23585} = \mathbf{P}(0,0,\eta^{28},1) = \mathbf{P}(0,0,22,1)$
$24: P_{24609} = \mathbf{P}(0,0,\eta^{26},1) = \mathbf{P}(0,0,23,1)$
$25: P_{25633} = \mathbf{P}(0,0,\eta^{21},1) = \mathbf{P}(0,0,24,1)$
$26: P_{26657} = \mathbf{P}(0,0,\eta^{25},1) = \mathbf{P}(0,0,25,1)$
$27: P_{27681} = \mathbf{P}(0,0,\eta^{9},1) = \mathbf{P}(0,0,26,1)$
$28: P_{28705} = \mathbf{P}(0,0,\eta^{16},1) = \mathbf{P}(0,0,27,1)$
$29: P_{29729} = \mathbf{P}(0,0,\eta^{13},1) = \mathbf{P}(0,0,28,1)$
$30: P_{30753} = \mathbf{P}(0,0,\eta^{14},1) = \mathbf{P}(0,0,29,1)$
$31: P_{31777} = \mathbf{P}(0,0,\eta^{24},1) = \mathbf{P}(0,0,30,1)$
$32: P_{32801} = \mathbf{P}(0,0,\eta^{15},1) = \mathbf{P}(0,0,31,1)$

The 1 Lines

The lines and their Pluecker coordinates are:

$$\ell_0 = \left[\begin{array}{cccc} 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{array}\right]_{1083424} = \left[\begin{array}{cccc} 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{array}\right]_{1083424} = \mathbf{Pl}(0,1,0,0,0,0)_1$$

Rank of lines: (1083424)
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 33 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
$2: P_{2082} = (0,0,1,1)$ lies on line ℓ_0
$3: P_{3105} = (0,0,2,1)$ lies on line ℓ_0
$4: P_{4129} = (0,0,3,1)$ lies on line ℓ_0
$5: P_{5153} = (0,0,4,1)$ lies on line ℓ_0
$6: P_{6177} = (0,0,5,1)$ lies on line ℓ_0
$7: P_{7201} = (0,0,6,1)$ lies on line ℓ_0
$8: P_{8225} = (0,0,7,1)$ lies on line ℓ_0
$9: P_{9249} = (0,0,8,1)$ lies on line ℓ_0
$10: P_{10273} = (0,0,9,1)$ lies on line ℓ_0
$11: P_{11297} = (0,0,10,1)$ lies on line ℓ_0
$12: P_{12321} = (0,0,11,1)$ lies on line ℓ_0
$13: P_{13345} = (0,0,12,1)$ lies on line ℓ_0
$14: P_{14369} = (0,0,13,1)$ lies on line ℓ_0
$15: P_{15393} = (0,0,14,1)$ lies on line ℓ_0
$16: P_{16417} = (0,0,15,1)$ lies on line ℓ_0
$17: P_{17441} = (0,0,16,1)$ lies on line ℓ_0
$18: P_{18465} = (0,0,17,1)$ lies on line ℓ_0
$19: P_{19489} = (0,0,18,1)$ lies on line ℓ_0
$20: P_{20513} = (0,0,19,1)$ lies on line ℓ_0
$21: P_{21537} = (0,0,20,1)$ lies on line ℓ_0
$22: P_{22561} = (0,0,21,1)$ lies on line ℓ_0
$23: P_{23585} = (0,0,22,1)$ lies on line ℓ_0
$24: P_{24609} = (0,0,23,1)$ lies on line ℓ_0
$25: P_{25633} = (0,0,24,1)$ lies on line ℓ_0
$26: P_{26657} = (0,0,25,1)$ lies on line ℓ_0
$27: P_{27681} = (0,0,26,1)$ lies on line ℓ_0
$28: P_{28705} = (0,0,27,1)$ lies on line ℓ_0
$29: P_{29729} = (0,0,28,1)$ lies on line ℓ_0
$30: P_{30753} = (0,0,29,1)$ lies on line ℓ_0
$31: P_{31777} = (0,0,30,1)$ lies on line ℓ_0
$32: P_{32801} = (0,0,31,1)$ lies on line ℓ_0

The single points on the surface are:

Points on surface but on no line

The surface has 0 points not on any line:
The points on the surface but not on lines are:

Line Intersection Graph

	0
0	0

Neighbor sets in the line intersection graph:
Line 0 intersects

Line
in point

The surface has 33 points:
The points on the surface are:

0 : $P_{2} = (0, 0, 1, 0)$
1 : $P_{3} = (0, 0, 0, 1)$
2 : $P_{2082} = (0, 0, 1, 1)$
3 : $P_{3105} = (0, 0, 2, 1)$
4 : $P_{4129} = (0, 0, 3, 1)$
5 : $P_{5153} = (0, 0, 4, 1)$
6 : $P_{6177} = (0, 0, 5, 1)$
7 : $P_{7201} = (0, 0, 6, 1)$
8 : $P_{8225} = (0, 0, 7, 1)$
9 : $P_{9249} = (0, 0, 8, 1)$
10 : $P_{10273} = (0, 0, 9, 1)$
11 : $P_{11297} = (0, 0, 10, 1)$
12 : $P_{12321} = (0, 0, 11, 1)$
13 : $P_{13345} = (0, 0, 12, 1)$
14 : $P_{14369} = (0, 0, 13, 1)$
15 : $P_{15393} = (0, 0, 14, 1)$
16 : $P_{16417} = (0, 0, 15, 1)$
17 : $P_{17441} = (0, 0, 16, 1)$
18 : $P_{18465} = (0, 0, 17, 1)$
19 : $P_{19489} = (0, 0, 18, 1)$
20 : $P_{20513} = (0, 0, 19, 1)$
21 : $P_{21537} = (0, 0, 20, 1)$
22 : $P_{22561} = (0, 0, 21, 1)$
23 : $P_{23585} = (0, 0, 22, 1)$
24 : $P_{24609} = (0, 0, 23, 1)$
25 : $P_{25633} = (0, 0, 24, 1)$
26 : $P_{26657} = (0, 0, 25, 1)$
27 : $P_{27681} = (0, 0, 26, 1)$
28 : $P_{28705} = (0, 0, 27, 1)$
29 : $P_{29729} = (0, 0, 28, 1)$
30 : $P_{30753} = (0, 0, 29, 1)$
31 : $P_{31777} = (0, 0, 30, 1)$
32 : $P_{32801} = (0, 0, 31, 1)$