

Rank-74296 over GF(64)

January 15, 2021

The equation

The equation of the surface is :

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

(1, 0, 1, 0, 1, 1, 0, 0, 0, 1, 0, 0, 0, 1, 0, 0, 1, 0, 0, 0)

The point rank of the equation over GF(64) is -2113658810

General information

Number of lines	1
Number of points	4161
Number of singular points	1
Number of Eckardt points	0
Number of double points	0
Number of single points	65
Number of points off lines	4096
Number of Hesse planes	0
Number of axes	0
Type of points on lines	65
Type of lines on points	$1^{65}, 0^{4096}$

Singular Points

The surface has 1 singular points:

$$0 : P_{8259} = \mathbf{P}(1, 0, 1, 1) = \mathbf{P}(1, 0, 1, 1)$$

The 1 Lines

The lines and their Pluecker coordinates are:

$$\ell_0 = \begin{bmatrix} 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & 1 \end{bmatrix}_{270530} = \begin{bmatrix} 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & 1 \end{bmatrix}_{270530} = \mathbf{Pl}(1, 0, 1, 1, 1, 1)_{544579}$$

Rank of lines: (270530)
Rank of points on Klein quadric: (544579)

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 65 single points:
The single points on the surface are:

- | | |
|---|---|
| 0 : $P_5 = (1, 1, 0, 0)$ lies on line ℓ_0 | 33 : $P_{10338} = (33, 32, 1, 1)$ lies on line ℓ_0 |
| 1 : $P_{8259} = (1, 0, 1, 1)$ lies on line ℓ_0 | 34 : $P_{10401} = (32, 33, 1, 1)$ lies on line ℓ_0 |
| 2 : $P_{8322} = (0, 1, 1, 1)$ lies on line ℓ_0 | 35 : $P_{10468} = (35, 34, 1, 1)$ lies on line ℓ_0 |
| 3 : $P_{8388} = (3, 2, 1, 1)$ lies on line ℓ_0 | 36 : $P_{10531} = (34, 35, 1, 1)$ lies on line ℓ_0 |
| 4 : $P_{8451} = (2, 3, 1, 1)$ lies on line ℓ_0 | 37 : $P_{10598} = (37, 36, 1, 1)$ lies on line ℓ_0 |
| 5 : $P_{8518} = (5, 4, 1, 1)$ lies on line ℓ_0 | 38 : $P_{10661} = (36, 37, 1, 1)$ lies on line ℓ_0 |
| 6 : $P_{8581} = (4, 5, 1, 1)$ lies on line ℓ_0 | 39 : $P_{10728} = (39, 38, 1, 1)$ lies on line ℓ_0 |
| 7 : $P_{8648} = (7, 6, 1, 1)$ lies on line ℓ_0 | 40 : $P_{10791} = (38, 39, 1, 1)$ lies on line ℓ_0 |
| 8 : $P_{8711} = (6, 7, 1, 1)$ lies on line ℓ_0 | 41 : $P_{10858} = (41, 40, 1, 1)$ lies on line ℓ_0 |
| 9 : $P_{8778} = (9, 8, 1, 1)$ lies on line ℓ_0 | 42 : $P_{10921} = (40, 41, 1, 1)$ lies on line ℓ_0 |
| 10 : $P_{8841} = (8, 9, 1, 1)$ lies on line ℓ_0 | 43 : $P_{10988} = (43, 42, 1, 1)$ lies on line ℓ_0 |
| 11 : $P_{8908} = (11, 10, 1, 1)$ lies on line ℓ_0 | 44 : $P_{11051} = (42, 43, 1, 1)$ lies on line ℓ_0 |
| 12 : $P_{8971} = (10, 11, 1, 1)$ lies on line ℓ_0 | 45 : $P_{11118} = (45, 44, 1, 1)$ lies on line ℓ_0 |
| 13 : $P_{9038} = (13, 12, 1, 1)$ lies on line ℓ_0 | 46 : $P_{11181} = (44, 45, 1, 1)$ lies on line ℓ_0 |
| 14 : $P_{9101} = (12, 13, 1, 1)$ lies on line ℓ_0 | 47 : $P_{11248} = (47, 46, 1, 1)$ lies on line ℓ_0 |
| 15 : $P_{9168} = (15, 14, 1, 1)$ lies on line ℓ_0 | 48 : $P_{11311} = (46, 47, 1, 1)$ lies on line ℓ_0 |
| 16 : $P_{9231} = (14, 15, 1, 1)$ lies on line ℓ_0 | 49 : $P_{11378} = (49, 48, 1, 1)$ lies on line ℓ_0 |
| 17 : $P_{9298} = (17, 16, 1, 1)$ lies on line ℓ_0 | 50 : $P_{11441} = (48, 49, 1, 1)$ lies on line ℓ_0 |
| 18 : $P_{9361} = (16, 17, 1, 1)$ lies on line ℓ_0 | 51 : $P_{11508} = (51, 50, 1, 1)$ lies on line ℓ_0 |
| 19 : $P_{9428} = (19, 18, 1, 1)$ lies on line ℓ_0 | 52 : $P_{11571} = (50, 51, 1, 1)$ lies on line ℓ_0 |
| 20 : $P_{9491} = (18, 19, 1, 1)$ lies on line ℓ_0 | 53 : $P_{11638} = (53, 52, 1, 1)$ lies on line ℓ_0 |
| 21 : $P_{9558} = (21, 20, 1, 1)$ lies on line ℓ_0 | 54 : $P_{11701} = (52, 53, 1, 1)$ lies on line ℓ_0 |
| 22 : $P_{9621} = (20, 21, 1, 1)$ lies on line ℓ_0 | 55 : $P_{11768} = (55, 54, 1, 1)$ lies on line ℓ_0 |
| 23 : $P_{9688} = (23, 22, 1, 1)$ lies on line ℓ_0 | 56 : $P_{11831} = (54, 55, 1, 1)$ lies on line ℓ_0 |
| 24 : $P_{9751} = (22, 23, 1, 1)$ lies on line ℓ_0 | 57 : $P_{11898} = (57, 56, 1, 1)$ lies on line ℓ_0 |
| 25 : $P_{9818} = (25, 24, 1, 1)$ lies on line ℓ_0 | 58 : $P_{11961} = (56, 57, 1, 1)$ lies on line ℓ_0 |
| 26 : $P_{9881} = (24, 25, 1, 1)$ lies on line ℓ_0 | 59 : $P_{12028} = (59, 58, 1, 1)$ lies on line ℓ_0 |
| 27 : $P_{9948} = (27, 26, 1, 1)$ lies on line ℓ_0 | 60 : $P_{12091} = (58, 59, 1, 1)$ lies on line ℓ_0 |
| 28 : $P_{10011} = (26, 27, 1, 1)$ lies on line ℓ_0 | 61 : $P_{12158} = (61, 60, 1, 1)$ lies on line ℓ_0 |
| 29 : $P_{10078} = (29, 28, 1, 1)$ lies on line ℓ_0 | 62 : $P_{12221} = (60, 61, 1, 1)$ lies on line ℓ_0 |
| 30 : $P_{10141} = (28, 29, 1, 1)$ lies on line ℓ_0 | 63 : $P_{12288} = (63, 62, 1, 1)$ lies on line ℓ_0 |
| 31 : $P_{10208} = (31, 30, 1, 1)$ lies on line ℓ_0 | 64 : $P_{12351} = (62, 63, 1, 1)$ lies on line ℓ_0 |
| 32 : $P_{10271} = (30, 31, 1, 1)$ lies on line ℓ_0 | |

The single points on the surface are:

Points on surface but on no line

The surface has 4096 points not on any line:
Too many to print.

Line Intersection Graph

$$\begin{array}{c|c} & 0 \\ \hline 0 & \end{array}$$

Neighbor sets in the line intersection graph:
Line 0 intersects

Line
in point

The surface has 4161 points:
Too many to print.