

Rank-65735 over GF(64)

January 15, 2021

The equation

The equation of the surface is :

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

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

The point rank of the equation over GF(64) is 1090789445

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:

$$0 : P_3 = \mathbf{P}(0, 0, 0, 1) = \mathbf{P}(0, 0, 0, 1)$$

The 1 Lines

The lines and their Pluecker coordinates are:

$$\ell_0 = \begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}_{17043520} = \begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}_{17043520} = \mathbf{Pl}(0, 0, 0, 1, 0, 0)_{129}$$

Rank of lines: (17043520)
Rank of points on Klein quadric: (129)

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 : $P_1 = (0, 1, 0, 0)$ lies on line ℓ_0 | 33 : $P_{6210} = (0, 32, 0, 1)$ lies on line ℓ_0 |
| 1 : $P_3 = (0, 0, 0, 1)$ lies on line ℓ_0 | 34 : $P_{6274} = (0, 33, 0, 1)$ lies on line ℓ_0 |
| 2 : $P_{4226} = (0, 1, 0, 1)$ lies on line ℓ_0 | 35 : $P_{6338} = (0, 34, 0, 1)$ lies on line ℓ_0 |
| 3 : $P_{4290} = (0, 2, 0, 1)$ lies on line ℓ_0 | 36 : $P_{6402} = (0, 35, 0, 1)$ lies on line ℓ_0 |
| 4 : $P_{4354} = (0, 3, 0, 1)$ lies on line ℓ_0 | 37 : $P_{6466} = (0, 36, 0, 1)$ lies on line ℓ_0 |
| 5 : $P_{4418} = (0, 4, 0, 1)$ lies on line ℓ_0 | 38 : $P_{6530} = (0, 37, 0, 1)$ lies on line ℓ_0 |
| 6 : $P_{4482} = (0, 5, 0, 1)$ lies on line ℓ_0 | 39 : $P_{6594} = (0, 38, 0, 1)$ lies on line ℓ_0 |
| 7 : $P_{4546} = (0, 6, 0, 1)$ lies on line ℓ_0 | 40 : $P_{6658} = (0, 39, 0, 1)$ lies on line ℓ_0 |
| 8 : $P_{4610} = (0, 7, 0, 1)$ lies on line ℓ_0 | 41 : $P_{6722} = (0, 40, 0, 1)$ lies on line ℓ_0 |
| 9 : $P_{4674} = (0, 8, 0, 1)$ lies on line ℓ_0 | 42 : $P_{6786} = (0, 41, 0, 1)$ lies on line ℓ_0 |
| 10 : $P_{4738} = (0, 9, 0, 1)$ lies on line ℓ_0 | 43 : $P_{6850} = (0, 42, 0, 1)$ lies on line ℓ_0 |
| 11 : $P_{4802} = (0, 10, 0, 1)$ lies on line ℓ_0 | 44 : $P_{6914} = (0, 43, 0, 1)$ lies on line ℓ_0 |
| 12 : $P_{4866} = (0, 11, 0, 1)$ lies on line ℓ_0 | 45 : $P_{6978} = (0, 44, 0, 1)$ lies on line ℓ_0 |
| 13 : $P_{4930} = (0, 12, 0, 1)$ lies on line ℓ_0 | 46 : $P_{7042} = (0, 45, 0, 1)$ lies on line ℓ_0 |
| 14 : $P_{4994} = (0, 13, 0, 1)$ lies on line ℓ_0 | 47 : $P_{7106} = (0, 46, 0, 1)$ lies on line ℓ_0 |
| 15 : $P_{5058} = (0, 14, 0, 1)$ lies on line ℓ_0 | 48 : $P_{7170} = (0, 47, 0, 1)$ lies on line ℓ_0 |
| 16 : $P_{5122} = (0, 15, 0, 1)$ lies on line ℓ_0 | 49 : $P_{7234} = (0, 48, 0, 1)$ lies on line ℓ_0 |
| 17 : $P_{5186} = (0, 16, 0, 1)$ lies on line ℓ_0 | 50 : $P_{7298} = (0, 49, 0, 1)$ lies on line ℓ_0 |
| 18 : $P_{5250} = (0, 17, 0, 1)$ lies on line ℓ_0 | 51 : $P_{7362} = (0, 50, 0, 1)$ lies on line ℓ_0 |
| 19 : $P_{5314} = (0, 18, 0, 1)$ lies on line ℓ_0 | 52 : $P_{7426} = (0, 51, 0, 1)$ lies on line ℓ_0 |
| 20 : $P_{5378} = (0, 19, 0, 1)$ lies on line ℓ_0 | 53 : $P_{7490} = (0, 52, 0, 1)$ lies on line ℓ_0 |
| 21 : $P_{5442} = (0, 20, 0, 1)$ lies on line ℓ_0 | 54 : $P_{7554} = (0, 53, 0, 1)$ lies on line ℓ_0 |
| 22 : $P_{5506} = (0, 21, 0, 1)$ lies on line ℓ_0 | 55 : $P_{7618} = (0, 54, 0, 1)$ lies on line ℓ_0 |
| 23 : $P_{5570} = (0, 22, 0, 1)$ lies on line ℓ_0 | 56 : $P_{7682} = (0, 55, 0, 1)$ lies on line ℓ_0 |
| 24 : $P_{5634} = (0, 23, 0, 1)$ lies on line ℓ_0 | 57 : $P_{7746} = (0, 56, 0, 1)$ lies on line ℓ_0 |
| 25 : $P_{5698} = (0, 24, 0, 1)$ lies on line ℓ_0 | 58 : $P_{7810} = (0, 57, 0, 1)$ lies on line ℓ_0 |
| 26 : $P_{5762} = (0, 25, 0, 1)$ lies on line ℓ_0 | 59 : $P_{7874} = (0, 58, 0, 1)$ lies on line ℓ_0 |
| 27 : $P_{5826} = (0, 26, 0, 1)$ lies on line ℓ_0 | 60 : $P_{7938} = (0, 59, 0, 1)$ lies on line ℓ_0 |
| 28 : $P_{5890} = (0, 27, 0, 1)$ lies on line ℓ_0 | 61 : $P_{8002} = (0, 60, 0, 1)$ lies on line ℓ_0 |
| 29 : $P_{5954} = (0, 28, 0, 1)$ lies on line ℓ_0 | 62 : $P_{8066} = (0, 61, 0, 1)$ lies on line ℓ_0 |
| 30 : $P_{6018} = (0, 29, 0, 1)$ lies on line ℓ_0 | 63 : $P_{8130} = (0, 62, 0, 1)$ lies on line ℓ_0 |
| 31 : $P_{6082} = (0, 30, 0, 1)$ lies on line ℓ_0 | 64 : $P_{8194} = (0, 63, 0, 1)$ lies on line ℓ_0 |
| 32 : $P_{6146} = (0, 31, 0, 1)$ 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.