Rank-65873 over GF(64)

January 15, 2021

The equation

The equation of the surface is :

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

(0, 1, 1, 1, 0, 0, 1, 0, 1, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0)
The point rank of the equation over GF(64) is 1091051653

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:

$0 : P_{4163} = \mathbf{P}(1, 0, 0, 1) = \mathbf{P}(1, 0, 0, 1)$

The 1 Lines

The lines and their Pluecker coordinates are:

$$\ell_0 = \begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 1 & 1 \end{bmatrix}_{266369} = \begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 1 & 1 \end{bmatrix}_{266369} = \mathbf{Pl}(1, 1, 1, 1, 1, 0)_{20354}$$

Rank of lines: (266369)
Rank of points on Klein quadric: (20354)

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:

$0: P_{132} = (1, 1, 1, 0)$ lies on line ℓ_0
$1: P_{4163} = (1, 0, 0, 1)$ lies on line ℓ_0
$2: P_{8322} = (0, 1, 1, 1)$ lies on line ℓ_0
$3: P_{12484} = (3, 2, 2, 1)$ lies on line ℓ_0
$4: P_{16643} = (2, 3, 3, 1)$ lies on line ℓ_0
$5: P_{20806} = (5, 4, 4, 1)$ lies on line ℓ_0
$6: P_{24965} = (4, 5, 5, 1)$ lies on line ℓ_0
$7: P_{29128} = (7, 6, 6, 1)$ lies on line ℓ_0
$8: P_{33287} = (6, 7, 7, 1)$ lies on line ℓ_0
$9: P_{37450} = (9, 8, 8, 1)$ lies on line ℓ_0
$10: P_{41609} = (8, 9, 9, 1)$ lies on line ℓ_0
$11: P_{45772} = (11, 10, 10, 1)$ lies on line ℓ_0
$12: P_{49931} = (10, 11, 11, 1)$ lies on line ℓ_0
$13: P_{54094} = (13, 12, 12, 1)$ lies on line ℓ_0
$14: P_{58253} = (12, 13, 13, 1)$ lies on line ℓ_0
$15: P_{62416} = (15, 14, 14, 1)$ lies on line ℓ_0
$16: P_{66575} = (14, 15, 15, 1)$ lies on line ℓ_0
$17: P_{70738} = (17, 16, 16, 1)$ lies on line ℓ_0
$18: P_{74897} = (16, 17, 17, 1)$ lies on line ℓ_0
$19: P_{79060} = (19, 18, 18, 1)$ lies on line ℓ_0
$20: P_{83219} = (18, 19, 19, 1)$ lies on line ℓ_0
$21: P_{87382} = (21, 20, 20, 1)$ lies on line ℓ_0
$22: P_{91541} = (20, 21, 21, 1)$ lies on line ℓ_0
$23: P_{95704} = (23, 22, 22, 1)$ lies on line ℓ_0
$24: P_{99863} = (22, 23, 23, 1)$ lies on line ℓ_0
$25: P_{104026} = (25, 24, 24, 1)$ lies on line ℓ_0
$26: P_{108185} = (24, 25, 25, 1)$ lies on line ℓ_0
$27: P_{112348} = (27, 26, 26, 1)$ lies on line ℓ_0
$28: P_{116507} = (26, 27, 27, 1)$ lies on line ℓ_0
$29: P_{120670} = (29, 28, 28, 1)$ lies on line ℓ_0
$30: P_{124829} = (28, 29, 29, 1)$ lies on line ℓ_0
$31: P_{128992} = (31, 30, 30, 1)$ lies on line ℓ_0
$32: P_{133151} = (30, 31, 31, 1)$ lies on line ℓ_0

$33: P_{137314} = (33, 32, 32, 1)$ lies on line ℓ_0
$34: P_{141473} = (32, 33, 33, 1)$ lies on line ℓ_0
$35: P_{145636} = (35, 34, 34, 1)$ lies on line ℓ_0
$36: P_{149795} = (34, 35, 35, 1)$ lies on line ℓ_0
$37: P_{153958} = (37, 36, 36, 1)$ lies on line ℓ_0
$38: P_{158117} = (36, 37, 37, 1)$ lies on line ℓ_0
$39: P_{162280} = (39, 38, 38, 1)$ lies on line ℓ_0
$40: P_{166439} = (38, 39, 39, 1)$ lies on line ℓ_0
$41: P_{170602} = (41, 40, 40, 1)$ lies on line ℓ_0
$42: P_{174761} = (40, 41, 41, 1)$ lies on line ℓ_0
$43: P_{178924} = (43, 42, 42, 1)$ lies on line ℓ_0
$44: P_{183083} = (42, 43, 43, 1)$ lies on line ℓ_0
$45: P_{187246} = (45, 44, 44, 1)$ lies on line ℓ_0
$46: P_{191405} = (44, 45, 45, 1)$ lies on line ℓ_0
$47: P_{195568} = (47, 46, 46, 1)$ lies on line ℓ_0
$48: P_{199727} = (46, 47, 47, 1)$ lies on line ℓ_0
$49: P_{203890} = (49, 48, 48, 1)$ lies on line ℓ_0
$50: P_{208049} = (48, 49, 49, 1)$ lies on line ℓ_0
$51: P_{212212} = (51, 50, 50, 1)$ lies on line ℓ_0
$52: P_{216371} = (50, 51, 51, 1)$ lies on line ℓ_0
$53: P_{220534} = (53, 52, 52, 1)$ lies on line ℓ_0
$54: P_{224693} = (52, 53, 53, 1)$ lies on line ℓ_0
$55: P_{228856} = (55, 54, 54, 1)$ lies on line ℓ_0
$56: P_{233015} = (54, 55, 55, 1)$ lies on line ℓ_0
$57: P_{237178} = (57, 56, 56, 1)$ lies on line ℓ_0
$58: P_{241337} = (56, 57, 57, 1)$ lies on line ℓ_0
$59: P_{245500} = (59, 58, 58, 1)$ lies on line ℓ_0
$60: P_{249659} = (58, 59, 59, 1)$ lies on line ℓ_0
$61: P_{253822} = (61, 60, 60, 1)$ lies on line ℓ_0
$62: P_{257981} = (60, 61, 61, 1)$ lies on line ℓ_0
$63: P_{262144} = (63, 62, 62, 1)$ lies on line ℓ_0
$64: P_{266303} = (62, 63, 63, 1)$ 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

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

Neighbor sets in the line intersection graph:
Line 0 intersects

Line
in point

The surface has 4161 points:
Too many to print.