Rank-76323 over GF(64)

January 15, 2021

The equation

The equation of the surface is :

$$X_0^2X_2 + X_1^2X_3 + X_1X_2^2 + X_0X_3^2 + X_0X_1X_2 = 0$$

(0, 0, 0, 0, 0, 1, 0, 0, 0, 1, 0, 1, 0, 1, 0, 0, 1, 0, 0, 0)
The point rank of the equation over GF(64) is -2130440123

General information

Number of lines	2
Number of points	4225
Number of singular points	0
Number of Eckardt points	0
Number of double points	0
Number of single points	130
Number of points off lines	4095
Number of Hesse planes	0
Number of axes	0
Type of points on lines	65^2
Type of lines on points	1^{130}, 0^{4095}

Singular Points

The surface has 0 singular points:

The 2 Lines

The lines and their Pluecker coordinates are:

$$\ell_0 = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \end{bmatrix}_0 = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \end{bmatrix}_0 = \mathbf{Pl}(1,0,0,0,0,0)_0$$

$$\ell_1 = \begin{bmatrix} 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}_{17047616} = \begin{bmatrix} 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}_{17047616} = \mathbf{Pl}(0,1,0,0,0,0)_1$$

Rank of lines: (0, 17047616)
Rank of points on Klein quadric: (0, 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 130 single points:
The single points on the surface are:

$0: P_0 = (1,0,0,0)$ lies on line ℓ_0
$1: P_1 = (0,1,0,0)$ lies on line ℓ_0
$2: P_2 = (0,0,1,0)$ lies on line ℓ_1
$3: P_3 = (0,0,0,1)$ lies on line ℓ_1
$4: P_5 = (1,1,0,0)$ lies on line ℓ_0
$5: P_6 = (2,1,0,0)$ lies on line ℓ_0
$6: P_7 = (3,1,0,0)$ lies on line ℓ_0
$7: P_8 = (4,1,0,0)$ lies on line ℓ_0
$8: P_9 = (5,1,0,0)$ lies on line ℓ_0
$9: P_{10} = (6,1,0,0)$ lies on line ℓ_0
$10: P_{11} = (7,1,0,0)$ lies on line ℓ_0
$11: P_{12} = (8,1,0,0)$ lies on line ℓ_0
$12: P_{13} = (9,1,0,0)$ lies on line ℓ_0
$13: P_{14} = (10,1,0,0)$ lies on line ℓ_0
$14: P_{15} = (11,1,0,0)$ lies on line ℓ_0
$15: P_{16} = (12,1,0,0)$ lies on line ℓ_0
$16: P_{17} = (13,1,0,0)$ lies on line ℓ_0
$17: P_{18} = (14,1,0,0)$ lies on line ℓ_0
$18: P_{19} = (15,1,0,0)$ lies on line ℓ_0
$19: P_{20} = (16,1,0,0)$ lies on line ℓ_0
$20: P_{21} = (17,1,0,0)$ lies on line ℓ_0
$21: P_{22} = (18,1,0,0)$ lies on line ℓ_0
$22: P_{23} = (19,1,0,0)$ lies on line ℓ_0
$23: P_{24} = (20,1,0,0)$ lies on line ℓ_0
$24: P_{25} = (21,1,0,0)$ lies on line ℓ_0
$25: P_{26} = (22,1,0,0)$ lies on line ℓ_0
$26: P_{27} = (23,1,0,0)$ lies on line ℓ_0
$27: P_{28} = (24,1,0,0)$ lies on line ℓ_0
$28: P_{29} = (25,1,0,0)$ lies on line ℓ_0
$29: P_{30} = (26,1,0,0)$ lies on line ℓ_0
$30: P_{31} = (27,1,0,0)$ lies on line ℓ_0
$31: P_{32} = (28,1,0,0)$ lies on line ℓ_0
$32: P_{33} = (29,1,0,0)$ lies on line ℓ_0
$33: P_{34} = (30,1,0,0)$ lies on line ℓ_0
$34: P_{35} = (31,1,0,0)$ lies on line ℓ_0
$35: P_{36} = (32,1,0,0)$ lies on line ℓ_0
$36: P_{37} = (33,1,0,0)$ lies on line ℓ_0
$37: P_{38} = (34,1,0,0)$ lies on line ℓ_0
$38: P_{39} = (35,1,0,0)$ lies on line ℓ_0
$39: P_{40} = (36,1,0,0)$ lies on line ℓ_0
$40: P_{41} = (37,1,0,0)$ lies on line ℓ_0
$41: P_{42} = (38,1,0,0)$ lies on line ℓ_0
$42: P_{43} = (39,1,0,0)$ lies on line ℓ_0
$43: P_{44} = (40,1,0,0)$ lies on line ℓ_0
$44: P_{45} = (41,1,0,0)$ lies on line ℓ_0
$45: P_{46} = (42,1,0,0)$ lies on line ℓ_0
$46: P_{47} = (43,1,0,0)$ lies on line ℓ_0
$47: P_{48} = (44,1,0,0)$ lies on line ℓ_0
$48: P_{49} = (45,1,0,0)$ lies on line ℓ_0
$49: P_{50} = (46,1,0,0)$ lies on line ℓ_0
$50: P_{51} = (47,1,0,0)$ lies on line ℓ_0
$51: P_{52} = (48,1,0,0)$ lies on line ℓ_0
$52: P_{53} = (49,1,0,0)$ lies on line ℓ_0
$53: P_{54} = (50,1,0,0)$ lies on line ℓ_0
$54: P_{55} = (51,1,0,0)$ lies on line ℓ_0
$55: P_{56} = (52,1,0,0)$ lies on line ℓ_0
$56: P_{57} = (53,1,0,0)$ lies on line ℓ_0
$57: P_{58} = (54,1,0,0)$ lies on line ℓ_0
$58: P_{59} = (55,1,0,0)$ lies on line ℓ_0
$59: P_{60} = (56,1,0,0)$ lies on line ℓ_0
$60: P_{61} = (57,1,0,0)$ lies on line ℓ_0
$61: P_{62} = (58,1,0,0)$ lies on line ℓ_0
$62: P_{63} = (59,1,0,0)$ lies on line ℓ_0
$63: P_{64} = (60,1,0,0)$ lies on line ℓ_0
$64: P_{65} = (61,1,0,0)$ lies on line ℓ_0
$65: P_{66} = (62,1,0,0)$ lies on line ℓ_0

66 : $P_{67} = (63, 1, 0, 0)$ lies on line ℓ_0
67 : $P_{8258} = (0, 0, 1, 1)$ lies on line ℓ_1
68 : $P_{12353} = (0, 0, 2, 1)$ lies on line ℓ_1
69 : $P_{16449} = (0, 0, 3, 1)$ lies on line ℓ_1
70 : $P_{20545} = (0, 0, 4, 1)$ lies on line ℓ_1
71 : $P_{24641} = (0, 0, 5, 1)$ lies on line ℓ_1
72 : $P_{28737} = (0, 0, 6, 1)$ lies on line ℓ_1
73 : $P_{32833} = (0, 0, 7, 1)$ lies on line ℓ_1
74 : $P_{36929} = (0, 0, 8, 1)$ lies on line ℓ_1
75 : $P_{41025} = (0, 0, 9, 1)$ lies on line ℓ_1
76 : $P_{45121} = (0, 0, 10, 1)$ lies on line ℓ_1
77 : $P_{49217} = (0, 0, 11, 1)$ lies on line ℓ_1
78 : $P_{53313} = (0, 0, 12, 1)$ lies on line ℓ_1
79 : $P_{57409} = (0, 0, 13, 1)$ lies on line ℓ_1
80 : $P_{61505} = (0, 0, 14, 1)$ lies on line ℓ_1
81 : $P_{65601} = (0, 0, 15, 1)$ lies on line ℓ_1
82 : $P_{69697} = (0, 0, 16, 1)$ lies on line ℓ_1
83 : $P_{73793} = (0, 0, 17, 1)$ lies on line ℓ_1
84 : $P_{77889} = (0, 0, 18, 1)$ lies on line ℓ_1
85 : $P_{81985} = (0, 0, 19, 1)$ lies on line ℓ_1
86 : $P_{86081} = (0, 0, 20, 1)$ lies on line ℓ_1
87 : $P_{90177} = (0, 0, 21, 1)$ lies on line ℓ_1
88 : $P_{94273} = (0, 0, 22, 1)$ lies on line ℓ_1
89 : $P_{98369} = (0, 0, 23, 1)$ lies on line ℓ_1
90 : $P_{102465} = (0, 0, 24, 1)$ lies on line ℓ_1
91 : $P_{106561} = (0, 0, 25, 1)$ lies on line ℓ_1
92 : $P_{110657} = (0, 0, 26, 1)$ lies on line ℓ_1
93 : $P_{114753} = (0, 0, 27, 1)$ lies on line ℓ_1
94 : $P_{118849} = (0, 0, 28, 1)$ lies on line ℓ_1
95 : $P_{122945} = (0, 0, 29, 1)$ lies on line ℓ_1
96 : $P_{127041} = (0, 0, 30, 1)$ lies on line ℓ_1
97 : $P_{131137} = (0, 0, 31, 1)$ lies on line ℓ_1
98 : $P_{135233} = (0, 0, 32, 1)$ lies on line ℓ_1
99 : $P_{139329} = (0, 0, 33, 1)$ lies on line ℓ_1
100 : $P_{143425} = (0, 0, 34, 1)$ lies on line ℓ_1
101 : $P_{147521} = (0, 0, 35, 1)$ lies on line ℓ_1
102 : $P_{151617} = (0, 0, 36, 1)$ lies on line ℓ_1
103 : $P_{155713} = (0, 0, 37, 1)$ lies on line ℓ_1
104 : $P_{159809} = (0, 0, 38, 1)$ lies on line ℓ_1
105 : $P_{163905} = (0, 0, 39, 1)$ lies on line ℓ_1
106 : $P_{168001} = (0, 0, 40, 1)$ lies on line ℓ_1
107 : $P_{172097} = (0, 0, 41, 1)$ lies on line ℓ_1
108 : $P_{176193} = (0, 0, 42, 1)$ lies on line ℓ_1
109 : $P_{180289} = (0, 0, 43, 1)$ lies on line ℓ_1
110 : $P_{184385} = (0, 0, 44, 1)$ lies on line ℓ_1
111 : $P_{188481} = (0, 0, 45, 1)$ lies on line ℓ_1
112 : $P_{192577} = (0, 0, 46, 1)$ lies on line ℓ_1
113 : $P_{196673} = (0, 0, 47, 1)$ lies on line ℓ_1
114 : $P_{200769} = (0, 0, 48, 1)$ lies on line ℓ_1
115 : $P_{204865} = (0, 0, 49, 1)$ lies on line ℓ_1
116 : $P_{208961} = (0, 0, 50, 1)$ lies on line ℓ_1
117 : $P_{213057} = (0, 0, 51, 1)$ lies on line ℓ_1
118 : $P_{217153} = (0, 0, 52, 1)$ lies on line ℓ_1
119 : $P_{221249} = (0, 0, 53, 1)$ lies on line ℓ_1
120 : $P_{225345} = (0, 0, 54, 1)$ lies on line ℓ_1
121 : $P_{229441} = (0, 0, 55, 1)$ lies on line ℓ_1
122 : $P_{233537} = (0, 0, 56, 1)$ lies on line ℓ_1
123 : $P_{237633} = (0, 0, 57, 1)$ lies on line ℓ_1
124 : $P_{241729} = (0, 0, 58, 1)$ lies on line ℓ_1
125 : $P_{245825} = (0, 0, 59, 1)$ lies on line ℓ_1
126 : $P_{249921} = (0, 0, 60, 1)$ lies on line ℓ_1
127 : $P_{254017} = (0, 0, 61, 1)$ lies on line ℓ_1
128 : $P_{258113} = (0, 0, 62, 1)$ lies on line ℓ_1
129 : $P_{262209} = (0, 0, 63, 1)$ lies on line ℓ_1

The single points on the surface are:

Points on surface but on no line

The surface has 4095 points not on any line:
Too many to print.

Line Intersection Graph

	0	1
0	0	0
1	0	0

Neighbor sets in the line intersection graph:
Line 0 intersects

Line
in point

Line 1 intersects

Line
in point

The surface has 4225 points:
Too many to print.