Rank-65633 over GF(64)

January 15, 2021

The equation

The equation of the surface is :

$$X_1^3 + X_2^3 + X_3^3 + X_0^2X_1 + X_0^2X_3 + X_0X_1X_2 = 0$$

(0, 1, 1, 1, 1, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0)
The point rank of the equation over GF(64) is 1107828869

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:

$$\ell_0 = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 1 \end{bmatrix}_{64} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 1 \end{bmatrix}_{64} = \mathbf{Pl}(1,0,0,0,1,0)_{4226}$$

$$\ell_1 = \begin{bmatrix} 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 \end{bmatrix}_{8258} = \begin{bmatrix} 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 \end{bmatrix}_{8258} = \mathbf{Pl}(0,0,1,1,1,1)_{544578}$$

Rank of lines: (64, 8258)
Rank of points on Klein quadric: (4226, 544578)

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
$1: P_4 = (1,1,1,1)$ lies on line ℓ_1
$2: P_5 = (1,1,0,0)$ lies on line ℓ_1
$3: P_{4226} = (0,1,0,1)$ lies on line ℓ_0
$4: P_{4227} = (1,1,0,1)$ lies on line ℓ_0
$5: P_{4228} = (2,1,0,1)$ lies on line ℓ_0
$6: P_{4229} = (3,1,0,1)$ lies on line ℓ_0
$7: P_{4230} = (4,1,0,1)$ lies on line ℓ_0
$8: P_{4231} = (5,1,0,1)$ lies on line ℓ_0
$9: P_{4232} = (6,1,0,1)$ lies on line ℓ_0
$10: P_{4233} = (7,1,0,1)$ lies on line ℓ_0
$11: P_{4234} = (8,1,0,1)$ lies on line ℓ_0
$12: P_{4235} = (9,1,0,1)$ lies on line ℓ_0
$13: P_{4236} = (10,1,0,1)$ lies on line ℓ_0
$14: P_{4237} = (11,1,0,1)$ lies on line ℓ_0
$15: P_{4238} = (12,1,0,1)$ lies on line ℓ_0
$16: P_{4239} = (13,1,0,1)$ lies on line ℓ_0
$17: P_{4240} = (14,1,0,1)$ lies on line ℓ_0
$18: P_{4241} = (15,1,0,1)$ lies on line ℓ_0
$19: P_{4242} = (16,1,0,1)$ lies on line ℓ_0
$20: P_{4243} = (17,1,0,1)$ lies on line ℓ_0
$21: P_{4244} = (18,1,0,1)$ lies on line ℓ_0
$22: P_{4245} = (19,1,0,1)$ lies on line ℓ_0
$23: P_{4246} = (20,1,0,1)$ lies on line ℓ_0
$24: P_{4247} = (21,1,0,1)$ lies on line ℓ_0
$25: P_{4248} = (22,1,0,1)$ lies on line ℓ_0
$26: P_{4249} = (23,1,0,1)$ lies on line ℓ_0
$27: P_{4250} = (24,1,0,1)$ lies on line ℓ_0
$28: P_{4251} = (25,1,0,1)$ lies on line ℓ_0
$29: P_{4252} = (26,1,0,1)$ lies on line ℓ_0
$30: P_{4253} = (27,1,0,1)$ lies on line ℓ_0
$31: P_{4254} = (28,1,0,1)$ lies on line ℓ_0
$32: P_{4255} = (29,1,0,1)$ lies on line ℓ_0
$33: P_{4256} = (30,1,0,1)$ lies on line ℓ_0
$34: P_{4257} = (31,1,0,1)$ lies on line ℓ_0
$35: P_{4258} = (32,1,0,1)$ lies on line ℓ_0
$36: P_{4259} = (33,1,0,1)$ lies on line ℓ_0
$37: P_{4260} = (34,1,0,1)$ lies on line ℓ_0
$38: P_{4261} = (35,1,0,1)$ lies on line ℓ_0
$39: P_{4262} = (36,1,0,1)$ lies on line ℓ_0
$40: P_{4263} = (37,1,0,1)$ lies on line ℓ_0
$41: P_{4264} = (38,1,0,1)$ lies on line ℓ_0
$42: P_{4265} = (39,1,0,1)$ lies on line ℓ_0
$43: P_{4266} = (40,1,0,1)$ lies on line ℓ_0
$44: P_{4267} = (41,1,0,1)$ lies on line ℓ_0
$45: P_{4268} = (42,1,0,1)$ lies on line ℓ_0
$46: P_{4269} = (43,1,0,1)$ lies on line ℓ_0
$47: P_{4270} = (44,1,0,1)$ lies on line ℓ_0
$48: P_{4271} = (45,1,0,1)$ lies on line ℓ_0
$49: P_{4272} = (46,1,0,1)$ lies on line ℓ_0
$50: P_{4273} = (47,1,0,1)$ lies on line ℓ_0
$51: P_{4274} = (48,1,0,1)$ lies on line ℓ_0
$52: P_{4275} = (49,1,0,1)$ lies on line ℓ_0
$53: P_{4276} = (50,1,0,1)$ lies on line ℓ_0
$54: P_{4277} = (51,1,0,1)$ lies on line ℓ_0
$55: P_{4278} = (52,1,0,1)$ lies on line ℓ_0
$56: P_{4279} = (53,1,0,1)$ lies on line ℓ_0
$57: P_{4280} = (54,1,0,1)$ lies on line ℓ_0
$58: P_{4281} = (55,1,0,1)$ lies on line ℓ_0
$59: P_{4282} = (56,1,0,1)$ lies on line ℓ_0
$60: P_{4283} = (57,1,0,1)$ lies on line ℓ_0
$61: P_{4284} = (58,1,0,1)$ lies on line ℓ_0
$62: P_{4285} = (59,1,0,1)$ lies on line ℓ_0
$63: P_{4286} = (60,1,0,1)$ lies on line ℓ_0
$64: P_{4287} = (61,1,0,1)$ lies on line ℓ_0
$65: P_{4288} = (62,1,0,1)$ lies on line ℓ_0

66 : $P_{4289} = (63, 1, 0, 1)$ lies on line ℓ_0
67 : $P_{8258} = (0, 0, 1, 1)$ lies on line ℓ_1
68 : $P_{8387} = (2, 2, 1, 1)$ lies on line ℓ_1
69 : $P_{8452} = (3, 3, 1, 1)$ lies on line ℓ_1
70 : $P_{8517} = (4, 4, 1, 1)$ lies on line ℓ_1
71 : $P_{8582} = (5, 5, 1, 1)$ lies on line ℓ_1
72 : $P_{8647} = (6, 6, 1, 1)$ lies on line ℓ_1
73 : $P_{8712} = (7, 7, 1, 1)$ lies on line ℓ_1
74 : $P_{8777} = (8, 8, 1, 1)$ lies on line ℓ_1
75 : $P_{8842} = (9, 9, 1, 1)$ lies on line ℓ_1
76 : $P_{8907} = (10, 10, 1, 1)$ lies on line ℓ_1
77 : $P_{8972} = (11, 11, 1, 1)$ lies on line ℓ_1
78 : $P_{9037} = (12, 12, 1, 1)$ lies on line ℓ_1
79 : $P_{9102} = (13, 13, 1, 1)$ lies on line ℓ_1
80 : $P_{9167} = (14, 14, 1, 1)$ lies on line ℓ_1
81 : $P_{9232} = (15, 15, 1, 1)$ lies on line ℓ_1
82 : $P_{9297} = (16, 16, 1, 1)$ lies on line ℓ_1
83 : $P_{9362} = (17, 17, 1, 1)$ lies on line ℓ_1
84 : $P_{9427} = (18, 18, 1, 1)$ lies on line ℓ_1
85 : $P_{9492} = (19, 19, 1, 1)$ lies on line ℓ_1
86 : $P_{9557} = (20, 20, 1, 1)$ lies on line ℓ_1
87 : $P_{9622} = (21, 21, 1, 1)$ lies on line ℓ_1
88 : $P_{9687} = (22, 22, 1, 1)$ lies on line ℓ_1
89 : $P_{9752} = (23, 23, 1, 1)$ lies on line ℓ_1
90 : $P_{9817} = (24, 24, 1, 1)$ lies on line ℓ_1
91 : $P_{9882} = (25, 25, 1, 1)$ lies on line ℓ_1
92 : $P_{9947} = (26, 26, 1, 1)$ lies on line ℓ_1
93 : $P_{10012} = (27, 27, 1, 1)$ lies on line ℓ_1
94 : $P_{10077} = (28, 28, 1, 1)$ lies on line ℓ_1
95 : $P_{10142} = (29, 29, 1, 1)$ lies on line ℓ_1
96 : $P_{10207} = (30, 30, 1, 1)$ lies on line ℓ_1
97 : $P_{10272} = (31, 31, 1, 1)$ lies on line ℓ_1
98 : $P_{10337} = (32, 32, 1, 1)$ lies on line ℓ_1
99 : $P_{10402} = (33, 33, 1, 1)$ lies on line ℓ_1
100 : $P_{10467} = (34, 34, 1, 1)$ lies on line ℓ_1
101 : $P_{10532} = (35, 35, 1, 1)$ lies on line ℓ_1
102 : $P_{10597} = (36, 36, 1, 1)$ lies on line ℓ_1
103 : $P_{10662} = (37, 37, 1, 1)$ lies on line ℓ_1
104 : $P_{10727} = (38, 38, 1, 1)$ lies on line ℓ_1
105 : $P_{10792} = (39, 39, 1, 1)$ lies on line ℓ_1
106 : $P_{10857} = (40, 40, 1, 1)$ lies on line ℓ_1
107 : $P_{10922} = (41, 41, 1, 1)$ lies on line ℓ_1
108 : $P_{10987} = (42, 42, 1, 1)$ lies on line ℓ_1
109 : $P_{11052} = (43, 43, 1, 1)$ lies on line ℓ_1
110 : $P_{11117} = (44, 44, 1, 1)$ lies on line ℓ_1
111 : $P_{11182} = (45, 45, 1, 1)$ lies on line ℓ_1
112 : $P_{11247} = (46, 46, 1, 1)$ lies on line ℓ_1
113 : $P_{11312} = (47, 47, 1, 1)$ lies on line ℓ_1
114 : $P_{11377} = (48, 48, 1, 1)$ lies on line ℓ_1
115 : $P_{11442} = (49, 49, 1, 1)$ lies on line ℓ_1
116 : $P_{11507} = (50, 50, 1, 1)$ lies on line ℓ_1
117 : $P_{11572} = (51, 51, 1, 1)$ lies on line ℓ_1
118 : $P_{11637} = (52, 52, 1, 1)$ lies on line ℓ_1
119 : $P_{11702} = (53, 53, 1, 1)$ lies on line ℓ_1
120 : $P_{11767} = (54, 54, 1, 1)$ lies on line ℓ_1
121 : $P_{11832} = (55, 55, 1, 1)$ lies on line ℓ_1
122 : $P_{11897} = (56, 56, 1, 1)$ lies on line ℓ_1
123 : $P_{11962} = (57, 57, 1, 1)$ lies on line ℓ_1
124 : $P_{12027} = (58, 58, 1, 1)$ lies on line ℓ_1
125 : $P_{12092} = (59, 59, 1, 1)$ lies on line ℓ_1
126 : $P_{12157} = (60, 60, 1, 1)$ lies on line ℓ_1
127 : $P_{12222} = (61, 61, 1, 1)$ lies on line ℓ_1
128 : $P_{12287} = (62, 62, 1, 1)$ lies on line ℓ_1
129 : $P_{12352} = (63, 63, 1, 1)$ 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.