Rank-65569 over GF(32)

January 15, 2021

The equation

The equation of the surface is :

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

(0, 1, 1, 1, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0)
The point rank of the equation over GF(32) is 1109461061

General information

Number of lines	1
Number of points	1057
Number of singular points	0
Number of Eckardt points	0
Number of double points	0
Number of single points	33
Number of points off lines	1024
Number of Hesse planes	0
Number of axes	0
Type of points on lines	33
Type of lines on points	$1^{33}, 0^{1024}$

Singular Points

The surface has 0 singular points:

The 1 Lines

The lines and their Pluecker coordinates are:

$$\ell_0 = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 1 \end{bmatrix}_{1025} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 1 \end{bmatrix}_{1025} = \mathbf{Pl}(0,0,1,0,1,0)_{1152}$$

Rank of lines: (1025)
Rank of points on Klein quadric: (1152)

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

$0:\ P_0 = (1,0,0,0)$ lies on line ℓ_0
$1:\ P_{2082} = (0,0,1,1)$ lies on line ℓ_0
$2:\ P_{2083} = (1,0,1,1)$ lies on line ℓ_0
$3:\ P_{2084} = (2,0,1,1)$ lies on line ℓ_0
$4:\ P_{2085} = (3,0,1,1)$ lies on line ℓ_0
$5:\ P_{2086} = (4,0,1,1)$ lies on line ℓ_0
$6:\ P_{2087} = (5,0,1,1)$ lies on line ℓ_0
$7:\ P_{2088} = (6,0,1,1)$ lies on line ℓ_0
$8:\ P_{2089} = (7,0,1,1)$ lies on line ℓ_0
$9:\ P_{2090} = (8,0,1,1)$ lies on line ℓ_0
$10:\ P_{2091} = (9,0,1,1)$ lies on line ℓ_0
$11:\ P_{2092} = (10,0,1,1)$ lies on line ℓ_0
$12:\ P_{2093} = (11,0,1,1)$ lies on line ℓ_0
$13:\ P_{2094} = (12,0,1,1)$ lies on line ℓ_0
$14:\ P_{2095} = (13,0,1,1)$ lies on line ℓ_0
$15:\ P_{2096} = (14,0,1,1)$ lies on line ℓ_0
$16:\ P_{2097} = (15,0,1,1)$ lies on line ℓ_0

$17:\ P_{2098} = (16,0,1,1)$ lies on line ℓ_0
$18:\ P_{2099} = (17,0,1,1)$ lies on line ℓ_0
$19:\ P_{2100} = (18,0,1,1)$ lies on line ℓ_0
$20:\ P_{2101} = (19,0,1,1)$ lies on line ℓ_0
$21:\ P_{2102} = (20,0,1,1)$ lies on line ℓ_0
$22:\ P_{2103} = (21,0,1,1)$ lies on line ℓ_0
$23:\ P_{2104} = (22,0,1,1)$ lies on line ℓ_0
$24:\ P_{2105} = (23,0,1,1)$ lies on line ℓ_0
$25:\ P_{2106} = (24,0,1,1)$ lies on line ℓ_0
$26:\ P_{2107} = (25,0,1,1)$ lies on line ℓ_0
$27:\ P_{2108} = (26,0,1,1)$ lies on line ℓ_0
$28:\ P_{2109} = (27,0,1,1)$ lies on line ℓ_0
$29:\ P_{2110} = (28,0,1,1)$ lies on line ℓ_0
$30:\ P_{2111} = (29,0,1,1)$ lies on line ℓ_0
$31:\ P_{2112} = (30,0,1,1)$ lies on line ℓ_0
$32:\ P_{2113} = (31,0,1,1)$ lies on line ℓ_0

The single points on the surface are:

Points on surface but on no line

The surface has 1024 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 1057 points:
Too many to print.