Rank-65915 over GF(32)

January 15, 2021

The equation

The equation of the surface is :

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

(0, 0, 0, 1, 1, 1, 1, 0, 1, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0)
The point rank of the equation over GF(32) is -2078211035

General information

Number of lines	1
Number of points	1057
Number of singular points	1
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 1 singular points:

$0 : P_2 = \mathbf{P}(0,0,1,0) = \mathbf{P}(0,0,1,0)$

The 1 Lines

The lines and their Pluecker coordinates are:

$$\ell_0 = \begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 1 & 1 \end{bmatrix}_{33857} = \begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 1 & 1 \end{bmatrix}_{33857} = \mathbf{Pl}(1,1,1,1,1,0)_{5058}$$

Rank of lines: (33857)
Rank of points on Klein quadric: (5058)

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:

$0:\ P_{68} = (1,1,1,0)$ lies on line ℓ_0
$1:\ P_{1059} = (1,0,0,1)$ lies on line ℓ_0
$2:\ P_{2114} = (0,1,1,1)$ lies on line ℓ_0
$3:\ P_{3172} = (3,2,2,1)$ lies on line ℓ_0
$4:\ P_{4227} = (2,3,3,1)$ lies on line ℓ_0
$5:\ P_{5286} = (5,4,4,1)$ lies on line ℓ_0
$6:\ P_{6341} = (4,5,5,1)$ lies on line ℓ_0
$7:\ P_{7400} = (7,6,6,1)$ lies on line ℓ_0
$8:\ P_{8455} = (6,7,7,1)$ lies on line ℓ_0
$9:\ P_{9514} = (9,8,8,1)$ lies on line ℓ_0
$10:\ P_{10569} = (8,9,9,1)$ lies on line ℓ_0
$11:\ P_{11628} = (11,10,10,1)$ lies on line ℓ_0
$12:\ P_{12683} = (10,11,11,1)$ lies on line ℓ_0
$13:\ P_{13742} = (13,12,12,1)$ lies on line ℓ_0
$14:\ P_{14797} = (12,13,13,1)$ lies on line ℓ_0
$15:\ P_{15856} = (15,14,14,1)$ lies on line ℓ_0
$16:\ P_{16911} = (14,15,15,1)$ lies on line ℓ_0

$17:\ P_{17970} = (17,16,16,1)$ lies on line ℓ_0
$18:\ P_{19025} = (16,17,17,1)$ lies on line ℓ_0
$19:\ P_{20084} = (19,18,18,1)$ lies on line ℓ_0
$20:\ P_{21139} = (18,19,19,1)$ lies on line ℓ_0
$21:\ P_{22198} = (21,20,20,1)$ lies on line ℓ_0
$22:\ P_{23253} = (20,21,21,1)$ lies on line ℓ_0
$23:\ P_{24312} = (23,22,22,1)$ lies on line ℓ_0
$24:\ P_{25367} = (22,23,23,1)$ lies on line ℓ_0
$25:\ P_{26426} = (25,24,24,1)$ lies on line ℓ_0
$26:\ P_{27481} = (24,25,25,1)$ lies on line ℓ_0
$27:\ P_{28540} = (27,26,26,1)$ lies on line ℓ_0
$28:\ P_{29595} = (26,27,27,1)$ lies on line ℓ_0
$29:\ P_{30654} = (29,28,28,1)$ lies on line ℓ_0
$30:\ P_{31709} = (28,29,29,1)$ lies on line ℓ_0
$31:\ P_{32768} = (31,30,30,1)$ lies on line ℓ_0
$32:\ P_{33823} = (30,31,31,1)$ 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.