Rank-69 over GF(2)

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The equation

The equation of the surface is :

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

(1, 1, 1, 0, 1, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0)
The point rank of the equation over GF(2) is 69

General information

Number of lines	1
Number of points	3
Number of singular points	1
Number of Eckardt points	0
Number of double points	0
Number of single points	3
Number of points off lines	0
Number of Hesse planes	0
Number of axes	0
Type of points on lines	3
Type of lines on points	1^3

Singular Points

The surface has 1 singular points:

$0 : \ P_3 = \mathbf{P}(0,0,0,1) = \mathbf{P}(0,0,0,1)$

The 1 Lines

The lines and their Pluecker coordinates are:

$$\ell_0 = \begin{bmatrix} 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}_{33} = \begin{bmatrix} 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}_{33} = \mathbf{Pl}(0,1,0,1,0,0)_7$$

Rank of lines: (33)
Rank of points on Klein quadric: (7)

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

$0:\ P_3 = (0,0,0,1)$ lies on line ℓ_0
$1:\ P_7 = (0,1,1,0)$ lies on line ℓ_0
$2:\ P_{14} = (0,1,1,1)$ lies on line ℓ_0

The single points on the surface are:

Points on surface but on no line

The surface has 0 points not on any line:
The points on the surface but not on lines are:

Line Intersection Graph

	0
0	0

Neighbor sets in the line intersection graph:
Line 0 intersects

Line
in point

The surface has 3 points:
The points on the surface are:

$0:\ P_3 = (0,0,0,1)$
$1:\ P_7 = (0,1,1,0)$
$2:\ P_{14} = (0,1,1,1)$