Rank-74295 over GF(2)

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The equation

The equation of the surface is :

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

(0, 0, 1, 0, 1, 1, 0, 0, 0, 1, 0, 0, 0, 1, 0, 0, 1, 0, 0, 0)
The point rank of the equation over GF(2) is 74295

General information

Number of lines	2
Number of points	7
Number of singular points	1
Number of Eckardt points	0
Number of double points	0
Number of single points	6
Number of points off lines	1
Number of Hesse planes	0
Number of axes	0
Type of points on lines	3^2
Type of lines on points	$1^6, 0$

Singular Points

The surface has 1 singular points:

$$0 : P_6 = \mathbf{P}(1,0,1,0) = \mathbf{P}(1,0,1,0)$$

The 2 Lines

The lines and their Pluecker coordinates are:

$$\ell_0 = \begin{bmatrix} 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 \end{bmatrix}_7 = \begin{bmatrix} 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 \end{bmatrix}_7 = \mathbf{Pl}(1,0,0,0,0,1)_{20}$$

$$\ell_1 = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 1 & 1 \end{bmatrix}_3 = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 1 & 1 \end{bmatrix}_3 = \mathbf{Pl}(1,0,1,0,1,0)_{13}$$

Rank of lines: (7, 3)
Rank of points on Klein quadric: (20, 13)

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

$0 : P_0 = (1,0,0,0)$ lies on line ℓ_1 $4 : P_8 = (1,1,1,0)$ lies on line ℓ_0
$1 : P_1 = (0,1,0,0)$ lies on line ℓ_0 $5 : P_{14} = (0,1,1,1)$ lies on line ℓ_1
$2 : P_4 = (1,1,1,1)$ lies on line ℓ_1
$3 : P_6 = (1,0,1,0)$ lies on line ℓ_0

    The single points on the surface are:

Points on surface but on no line

The surface has 1 points not on any line:
The points on the surface but not on lines are:

$0 : P_3 = (0,0,0,1)$

Line Intersection Graph

$$\begin{array}{c|cc} & 0 & 1 \\ \hline 0 & 0 & 0 \\ 1 & 0 & 0 \end{array}$$

Neighbor sets in the line intersection graph:
Line 0 intersects

Line
in point

Line 1 intersects

Line
in point

The surface has 7 points:
The points on the surface are:

$0: P_0 = (1,0,0,0)$

$1: P_1 = (0,1,0,0)$

$2: P_3 = (0,0,0,1)$

$3: P_4 = (1,1,1,1)$

$4: P_6 = (1,0,1,0)$

$5: P_8 = (1,1,1,0)$

$6: P_{14} = (0,1,1,1)$