

# Rank-140 over GF(4)

January 15, 2021

## The equation

The equation of the surface is :

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

( 1, 1, 1, 1, 1, 1, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0 )

The point rank of the equation over GF(4) is 2744

## General information

Number of lines	0
Number of points	21
Number of singular points	0
Number of Eckardt points	0
Number of double points	0
Number of single points	0
Number of points off lines	21
Number of Hesse planes	0
Number of axes	0
Type of points on lines	
Type of lines on points	$0^{21}$

## Singular Points

The surface has 0 singular points:

## The 0 Lines

The lines and their Pluecker coordinates are:

Rank of lines: ( )

Rank of points on Klein quadric: ( )

### 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 0 single points:

The single points on the surface are:

The single points on the surface are:

### Points on surface but on no line

The surface has 21 points not on any line:

The points on the surface but not on lines are:

0 : $P_{11} = (0, 1, 1, 0)$	11 : $P_{53} = (0, 0, 2, 1)$
1 : $P_{15} = (0, 2, 1, 0)$	12 : $P_{56} = (3, 0, 2, 1)$
2 : $P_{18} = (3, 2, 1, 0)$	13 : $P_{66} = (1, 3, 2, 1)$
3 : $P_{19} = (0, 3, 1, 0)$	14 : $P_{67} = (2, 3, 2, 1)$
4 : $P_{21} = (2, 3, 1, 0)$	15 : $P_{68} = (3, 3, 2, 1)$
5 : $P_{26} = (0, 1, 0, 1)$	16 : $P_{69} = (0, 0, 3, 1)$
6 : $P_{30} = (0, 2, 0, 1)$	17 : $P_{71} = (2, 0, 3, 1)$
7 : $P_{33} = (3, 2, 0, 1)$	18 : $P_{78} = (1, 2, 3, 1)$
8 : $P_{34} = (0, 3, 0, 1)$	19 : $P_{79} = (2, 2, 3, 1)$
9 : $P_{36} = (2, 3, 0, 1)$	20 : $P_{80} = (3, 2, 3, 1)$
10 : $P_{38} = (0, 0, 1, 1)$	

### Line Intersection Graph

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Neighbor sets in the line intersection graph:

The surface has 21 points:

The points on the surface are:

0 : $P_{11} = (0, 1, 1, 0)$	8 : $P_{34} = (0, 3, 0, 1)$	16 : $P_{69} = (0, 0, 3, 1)$
1 : $P_{15} = (0, 2, 1, 0)$	9 : $P_{36} = (2, 3, 0, 1)$	17 : $P_{71} = (2, 0, 3, 1)$
2 : $P_{18} = (3, 2, 1, 0)$	10 : $P_{38} = (0, 0, 1, 1)$	18 : $P_{78} = (1, 2, 3, 1)$
3 : $P_{19} = (0, 3, 1, 0)$	11 : $P_{53} = (0, 0, 2, 1)$	19 : $P_{79} = (2, 2, 3, 1)$
4 : $P_{21} = (2, 3, 1, 0)$	12 : $P_{56} = (3, 0, 2, 1)$	20 : $P_{80} = (3, 2, 3, 1)$
5 : $P_{26} = (0, 1, 0, 1)$	13 : $P_{66} = (1, 3, 2, 1)$	
6 : $P_{30} = (0, 2, 0, 1)$	14 : $P_{67} = (2, 3, 2, 1)$	
7 : $P_{33} = (3, 2, 0, 1)$	15 : $P_{68} = (3, 3, 2, 1)$	