# 1 BLT set 4 over GF(31)

Points on the quadric $x_0^2 + x_1x_2 + x_3x_4$:

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

$P_2 = (0, 0, 1, 0, 0)$

$P_3 = (0, 1, 10, 30, 10)$

$P_4 = (0, 1, 18, 15, 5)$

$P_5 = (0, 1, 8, 10, 24)$

$P_6 = (0, 1, 19, 17, 8)$

$P_7 = (1, 26, 12, 28, 1)$

$P_8 = (1, 26, 21, 14, 3)$

$P_9 = (1, 1, 8, 9, 30)$

$P_{10} = (1, 10, 4, 10, 30)$

$P_{11} = (1, 26, 22, 15, 30)$

$P_{12} = (1, 14, 19, 28, 27)$

$P_{13} = (1, 6, 30, 5, 1)$

$P_{14} = (1, 1, 1, 4, 15)$

$P_{15} = (1, 23, 30, 18, 15)$

$P_{16} = (1, 1, 8, 12, 7)$

$P_{17} = (1, 6, 23, 26, 3)$

$P_{18} = (1, 7, 20, 15, 3)$

$P_{19} = (1, 11, 24, 23, 6)$

$P_{20} = (1, 22, 21, 21, 6)$

$P_{21} = (1, 3, 30, 10, 25)$

$P_{22} = (1, 10, 14, 13, 13)$

$P_{23} = (1, 28, 28, 6, 19)$

$P_{24} = (1, 23, 24, 1, 5)$

$P_{25} = (1, 19, 16, 1, 5)$

$P_{26} = (1, 30, 30, 17, 9)$

$P_{27} = (1, 6, 11, 27, 9)$

$P_{28} = (1, 11, 24, 21, 11)$

$P_{29} = (1, 25, 25, 20, 9)$

$P_{30} = (1, 27, 12, 19, 9)$

$P_{31} = (1, 7, 8, 4, 9)$

$P_{32} = (1, 24, 23, 4, 9)$

Stabilizer of order 4 is generated by:

$$g_1 = \begin{pmatrix} 11 & 0 & 0 & 22 & 3 \\ 0 & 30 & 0 & 0 & 0 \\ 0 & 27 & 30 & 22 & 28 \\ 17 & 28 & 0 & 26 & 2 \\ 11 & 22 & 0 & 18 & 26 \end{pmatrix}$$

$$g_2 = \begin{pmatrix} 13 & 14 & 8 & 2 & 15 \\ 4 & 15 & 17 & 14 & 5 \\ 7 & 11 & 15 & 3 & 1 \\ 23 & 1 & 5 & 10 & 21 \\ 1 & 3 & 14 & 5 & 10 \end{pmatrix}$$

Induced action on the BLT-set:

The induced group has order 4 and is generated by:

$g_1$ =(2, 5)(3, 4)(6, 20)(7, 29)(8, 24)(9, 10)(11, 12)(13, 18)(14, 31)(15, 27)(16, 23)(17, 19)(21, 28)(22, 25)(26, 32)

$g_2$ =(1, 30)(2, 27)(3, 9)(4, 10)(5, 15)(6, 8)(7, 14)(11, 28)(12, 21)(13, 17)(16, 22)(18, 19)(20, 24)(23, 25)(29, 31)

Kernel has order 1 and is generated by:

There are 9 orbits on the BLT set.

The orbit length are $[4^7, 2^2]$

The orbits are:

$O_0 = \{1, 30\}$ (length 2)

$O_1 = \{2, 5, 15, 27\}$ (length 4)

$O_2 = \{3, 4, 9, 10\}$ (length 4)

$O_3 = \{6, 8, 20, 24\}$ (length 4)

$O_4 = \{7, 14, 29, 31\}$ (length 4)

$O_5 = \{11, 12, 21, 28\}$ (length 4)

$O_6 = \{13, 17, 18, 19\}$ (length 4)

$O_7 = \{16, 22, 23, 25\}$ (length 4)

$O_8 = \{26, 32\}$ (length 2)

The actions induced on the orbits are:

Induced action on orbit $O_0 = \{1, 30\}$ (length 2)

The induced group has order 2 and is generated by:

$g_1$ =id

$g_2$ =(1, 2)

Kernel has order 2 and is generated by:

$$b_1 = \begin{pmatrix} 11 & 0 & 0 & 22 & 3 \\ 0 & 30 & 0 & 0 & 0 \\ 0 & 27 & 30 & 22 & 28 \\ 17 & 28 & 0 & 26 & 2 \\ 11 & 22 & 0 & 18 & 26 \end{pmatrix}$$

The kernel has 15408 orbits on the quadric.

The orbit length are $[2^{15376}, 1^{32}]$

Induced action on orbit $O_1 = \{2, 187\}$ (length 2)

The induced group has order 2 and is generated by:

$g_1$ =(1, 2)

Kernel has order 1 and is generated by:

Induced action on orbit $O_1 = \{2, 5, 15, 27\}$ (length 4)

The induced group has order 4 and is generated by:

$g_1$ =(1, 2)(3, 4)

$g_2$ =(1, 4)(2, 3)

Kernel has order 1 and is generated by:

Induced action on orbit $O_2 = \{3, 4, 9, 10\}$ (length 4)

The induced group has order 4 and is generated by:

$g_1$ =(1, 2)(3, 4)

$g_2$ =(1, 3)(2, 4)

Kernel has order 1 and is generated by:

Induced action on orbit $O_3 = \{6, 8, 20, 24\}$ (length 4)

The induced group has order 4 and is generated by:

$g_1$ =(1, 3)(2, 4)

$g_2$ =(1, 2)(3, 4)

Kernel has order 1 and is generated by:

Induced action on orbit $O_4 = \{7, 14, 29, 31\}$ (length 4)

The induced group has order 4 and is generated by:

$g_1$ =(1, 3)(2, 4)

$g_2$ =(1, 2)(3, 4)

Kernel has order 1 and is generated by:

Induced action on orbit $O_5 = \{11, 12, 21, 28\}$ (length 4)

The induced group has order 4 and is generated by:

$g_1$ =(1, 2)(3, 4)

$g_2$ =(1, 4)(2, 3)

Kernel has order 1 and is generated by:

Induced action on orbit $O_6 = \{13, 17, 18, 19\}$ (length 4)

The induced group has order 4 and is generated by:

$g_1$ =(1, 3)(2, 4)

$g_2$ =(1, 2)(3, 4)

Kernel has order 1 and is generated by:

Induced action on orbit $O_7 = \{16, 22, 23, 25\}$ (length 4)

The induced group has order 4 and is generated by:

$g_1$ =(1, 3)(2, 4)

$g_2$ =(1, 2)(3, 4)

Kernel has order 1 and is generated by:

Induced action on orbit $O_8 = \{26, 32\}$ (length 2)

The induced group has order 2 and is generated by:

$g_1$ =(1, 2)

$g_2$ =id

Kernel has order 2 and is generated by:

$$b_1 = \begin{pmatrix} 13 & 14 & 8 & 2 & 15 \\ 4 & 15 & 17 & 14 & 5 \\ 7 & 11 & 15 & 3 & 1 \\ 23 & 1 & 5 & 10 & 21 \\ 1 & 3 & 14 & 5 & 10 \end{pmatrix}$$

The kernel has 15409 orbits on the quadric.

The orbit length are $[2^{15375}, 1^{34}]$

Induced action on orbit $O_0 = \{1, 10307\}$ (length 2)

The induced group has order 2 and is generated by:

$g_1$ =(1, 2)

Kernel has order 1 and is generated by: