

1 BLT set 4 over GF(37)

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

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

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

$$P_3 = (0, 1, 18, 36, 18)$$

$$P_4 = (0, 1, 23, 18, 9)$$

$$P_5 = (0, 1, 6, 9, 24)$$

$$P_6 = (0, 1, 13, 34, 29)$$

$$P_7 = (0, 1, 22, 2, 26)$$

$$P_8 = (0, 1, 14, 27, 31)$$

$$P_9 = (1, 32, 1, 30, 10)$$

$$P_{10} = (1, 23, 21, 6, 18)$$

$$P_{11} = (1, 19, 1, 36, 20)$$

$$P_{12} = (1, 14, 30, 29, 11)$$

$$P_{13} = (1, 11, 20, 10, 26)$$

$$P_{14} = (1, 2, 10, 8, 2)$$

$$P_{15} = (1, 5, 3, 25, 26)$$

$$P_{16} = (1, 27, 35, 25, 11)$$

$$P_{17} = (1, 35, 34, 10, 3)$$

$$P_{18} = (1, 28, 15, 11, 29)$$

$$P_{19} = (1, 9, 6, 30, 29)$$

$$P_{20} = (1, 23, 36, 34, 5)$$

$$P_{21} = (1, 31, 3, 33, 5)$$

$$P_{22} = (1, 36, 22, 34, 30)$$

$$P_{23} = (1, 7, 17, 36, 9)$$

$$P_{24} = (1, 14, 16, 20, 35)$$

$$P_{25} = (1, 1, 6, 33, 11)$$

$$P_{26} = (1, 28, 24, 2, 15)$$

$$P_{27} = (1, 18, 28, 18, 11)$$

$$P_{28} = (1, 5, 36, 30, 10)$$

$$P_{29} = (1, 10, 2, 15, 6)$$

$$P_{30} = (1, 32, 10, 35, 31)$$

$$P_{31} = (1, 9, 15, 2, 6)$$

$$P_{32} = (1, 30, 32, 6, 31)$$

$$P_{33} = (1, 5, 9, 33, 30)$$

$$P_{34} = (1, 22, 4, 4, 24)$$

$$P_{35} = (1, 26, 35, 21, 13)$$

$$P_{36} = (1, 32, 3, 1, 14)$$

$$P_{37} = (1, 15, 33, 26, 35)$$

$$P_{38} = (1, 6, 34, 27, 2)$$

Stabilizer of order 4 is generated by:

$$g_1 = \begin{pmatrix} 36 & 0 & 0 & 0 & 0 \\ 0 & 1 & 18 & 36 & 18 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 18 & 36 & 0 \\ 0 & 0 & 36 & 0 & 36 \end{pmatrix}$$

$$g_2 = \begin{pmatrix} 11 & 0 & 26 & 2 & 14 \\ 13 & 6 & 10 & 26 & 4 \\ 0 & 0 & 31 & 0 & 0 \\ 7 & 0 & 7 & 32 & 32 \\ 1 & 0 & 32 & 15 & 32 \end{pmatrix}$$

Induced action on the BLT-set:

The induced group has order 4 and is generated by:

$$g_1 = (1, 3)(5, 8)(6, 7)(9, 15)(10, 12)(11, 27)(13, 35)(14, 17)(16, 29)(18, 31)(19, 26)(20, 24)(21, 38)(22, 25)(23, 32)(28, 30)(33, 36)(34, 37)$$

$$g_2 = (1, 31, 3, 18)(5, 10, 8, 12)(6, 30, 7, 28)(9, 20, 15, 24)(11, 26, 27, 19)(13, 33, 35, 36)(14, 16,$$

17, 29)(21, 32, 38, 23)(22, 37, 25, 34)

group order is small, so we list all elements $a_1 = \text{id}$

$a_2 = (1, 3)(5, 8)(6, 7)(9, 15)(10, 12)(11, 27)(13, 35)(14, 17)(16, 29)(18, 31)(19, 26)(20, 24)(21, 38)(22, 25)(23, 32)(28, 30)(33, 36)(34, 37)$

$a_3 = (1, 31, 3, 18)(5, 10, 8, 12)(6, 30, 7, 28)(9, 20, 15, 24)(11, 26, 27, 19)(13, 33, 35, 36)(14, 16, 17, 29)(21, 32, 38, 23)(22, 37, 25, 34)$

$a_4 = (1, 18, 3, 31)(5, 12, 8, 10)(6, 28, 7, 30)(9, 24, 15, 20)(11, 19, 27, 26)(13, 36, 35, 33)(14, 29, 17, 16)(21, 23, 38, 32)(22, 34, 25, 37)$

Kernel has order 1 and is generated by:

There are 11 orbits on the BLT set.

The orbit length are $[4^9, 1^2]$

The orbits are:

$O_0 = \{1, 3, 18, 31\}$ (length 4)

$O_1 = \{2\}$ (length 1)

$O_2 = \{4\}$ (length 1)

$O_3 = \{5, 8, 10, 12\}$ (length 4)

$O_4 = \{6, 7, 28, 30\}$ (length 4)

$O_5 = \{9, 15, 20, 24\}$ (length 4)

$O_6 = \{11, 19, 26, 27\}$ (length 4)

$O_7 = \{13, 33, 35, 36\}$ (length 4)

$O_8 = \{14, 16, 17, 29\}$ (length 4)

$O_9 = \{21, 23, 32, 38\}$ (length 4)

$O_{10} = \{22, 25, 34, 37\}$ (length 4)

The actions induced on the orbits are:

Induced action on orbit $O_0 = \{1, 3, 18, 31\}$ (length 4)

The induced group has order 4 and is generated by:

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

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

group order is small, so we list all elements $a_1 = \text{id}$

$$a_2 = (1, 2)(3, 4)$$

$$a_3 = (1, 4, 2, 3)$$

$$a_4 = (1, 3, 2, 4)$$

Kernel has order 1 and is generated by:

Induced action on orbit $O_1 = \{2\}$ (length 1)

The induced group has order 1 and is generated by:

$$g_1 = \text{id}$$

$$g_2 = \text{id}$$

group order is small, so we list all elements $a_1 = \text{id}$

Kernel has order 4 and is generated by:

$$b_1 = \begin{pmatrix} 36 & 0 & 0 & 0 & 0 \\ 0 & 1 & 18 & 36 & 18 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 18 & 36 & 0 \\ 0 & 0 & 36 & 0 & 36 \end{pmatrix}$$

$$b_2 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{pmatrix}$$

$$b_3 = \begin{pmatrix} 26 & 0 & 11 & 35 & 23 \\ 24 & 6 & 27 & 5 & 30 \\ 0 & 0 & 31 & 0 & 0 \\ 30 & 0 & 33 & 5 & 5 \\ 36 & 0 & 11 & 22 & 5 \end{pmatrix}$$

The kernel has 13026 orbits on the quadric.

The orbit length are $[4^{13005}, 2^{19}, 1^2]$

Induced action on orbit $O_{56} = \{67, 4488\}$ (length 2)

The induced group has order 2 and is generated by:

$$g_1 = \text{id}$$

$$g_2 = \text{id}$$

$$g_3 = (1, 2)$$

group order is small, so we list all elements $a_1 = \text{id}$

$$a_2 = \text{id}$$

Kernel has order 2 and is generated by:

$$b_1 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 36 & 19 & 1 & 19 \\ 0 & 0 & 36 & 0 & 0 \\ 0 & 0 & 19 & 1 & 0 \\ 0 & 0 & 1 & 0 & 1 \end{pmatrix}$$

The kernel has 26050 orbits on the quadric.

The orbit length are $[2^{26010}, 1^{40}]$

Induced action on orbit $O_0 = \{1, 185\}$ (length 2)

The induced group has order 2 and is generated by:

$$g_1 = (1, 2)$$

group order is small, so we list all elements $a_1 = \text{id}$

$$a_2 = (1, 2)$$

Kernel has order 1 and is generated by:

Induced action on orbit $O_2 = \{4\}$ (length 1)

The induced group has order 1 and is generated by:

$$g_1 = \text{id}$$

$$g_2 = \text{id}$$

group order is small, so we list all elements $a_1 = \text{id}$

Kernel has order 4 and is generated by:

$$b_1 = \begin{pmatrix} 36 & 0 & 0 & 0 & 0 \\ 0 & 1 & 18 & 36 & 18 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 18 & 36 & 0 \\ 0 & 0 & 36 & 0 & 36 \end{pmatrix}$$

$$b_2 = \begin{pmatrix} 26 & 0 & 11 & 35 & 23 \\ 24 & 6 & 27 & 5 & 30 \\ 0 & 0 & 31 & 0 & 0 \\ 30 & 0 & 33 & 5 & 5 \\ 36 & 0 & 11 & 22 & 5 \end{pmatrix}$$

The kernel has 13026 orbits on the quadric.

The orbit length are $[4^{13005}, 2^{19}, 1^2]$

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Kernel has order 1 and is generated by:

Induced action on orbit $O_3 = \{5, 8, 10, 12\}$ (length 4)

The induced group has order 4 and is generated by:

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

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

group order is small, so we list all elements $a_1 = \text{id}$

$a_2 = (1, 2)(3, 4)$

$a_3 = (1, 3, 2, 4)$

$a_4 = (1, 4, 2, 3)$

Kernel has order 1 and is generated by:

Induced action on orbit $O_4 = \{6, 7, 28, 30\}$ (length 4)

The induced group has order 4 and is generated by:

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

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

group order is small, so we list all elements $a_1 = \text{id}$

$$a_2 = (1, 2)(3, 4)$$

$$a_3 = (1, 4, 2, 3)$$

$$a_4 = (1, 3, 2, 4)$$

Kernel has order 1 and is generated by:

Induced action on orbit $O_5 = \{9, 15, 20, 24\}$ (length 4)

The induced group has order 4 and is generated by:

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

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

group order is small, so we list all elements $a_1 = \text{id}$

$$a_2 = (1, 2)(3, 4)$$

$$a_3 = (1, 3, 2, 4)$$

$$a_4 = (1, 4, 2, 3)$$

Kernel has order 1 and is generated by:

Induced action on orbit $O_6 = \{11, 19, 26, 27\}$ (length 4)

The induced group has order 4 and is generated by:

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

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

group order is small, so we list all elements $a_1 = \text{id}$

$$a_2 = (1, 4)(2, 3)$$

$$a_3 = (1, 3, 4, 2)$$

$$a_4 = (1, 2, 4, 3)$$

Kernel has order 1 and is generated by:

Induced action on orbit $O_7 = \{13, 33, 35, 36\}$ (length 4)

The induced group has order 4 and is generated by:

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

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

group order is small, so we list all elements $a_1 = \text{id}$

$$a_2 = (1, 3)(2, 4)$$

$$a_3 = (1, 2, 3, 4)$$

$$a_4 = (1, 4, 3, 2)$$

Kernel has order 1 and is generated by:

Induced action on orbit $O_8 = \{14, 16, 17, 29\}$ (length 4)

The induced group has order 4 and is generated by:

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

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

group order is small, so we list all elements $a_1 = \text{id}$

$$a_2 = (1, 3)(2, 4)$$

$$a_3 = (1, 2, 3, 4)$$

$$a_4 = (1, 4, 3, 2)$$

Kernel has order 1 and is generated by:

Induced action on orbit $O_9 = \{21, 23, 32, 38\}$ (length 4)

The induced group has order 4 and is generated by:

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

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

group order is small, so we list all elements $a_1 = \text{id}$

$$a_2 = (1, 4)(2, 3)$$

$$a_3 = (1, 3, 4, 2)$$

$$a_4 = (1, 2, 4, 3)$$

Kernel has order 1 and is generated by:

Induced action on orbit $O_{10} = \{22, 25, 34, 37\}$ (length 4)

The induced group has order 4 and is generated by:

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

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

group order is small, so we list all elements $a_1 = \text{id}$

$$a_2 = (1, 2)(3, 4)$$

$$a_3 = (1, 4, 2, 3)$$

$$a_4 = (1, 3, 2, 4)$$

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