Minimal Constraint Subsets found in 11-round trail~Zhang's paper Figure2 Skinny64-192

the 0 th Minimal Constraint set is:

y^2_1 + x^3_5 + k1_7 + k2_7_1 + k3_7_1= 0
y^2_1 + y^2_11 + x^3_13 + k1_7 + k2_7_1 + k3_7_1= 0
[y^2_4] + y^2_11 + [x^3_9] + k1_2 + k2_2_1 + k3_2_1= 0
[y^3_0] + y^3_10 + y^3_13 + [x^4_0] + k1_15 + k2_15_1 + k3_15_1= 0
y^3_2 + x^4_6 + k1_9 + k2_9_1 + k3_9_1= 0
y^3_2 + y^3_8 + x^4_14 + k1_9 + k2_9_1 + k3_9_1= 0
y^3_5 + y^3_8 + x^4_10 + k1_12 + k2_12_1 + k3_12_1= 0
[y^3_7] + y^3_10 + [x^4_8] + k1_13 + k2_13_1 + k3_13_1= 0
[y^4_0] + y^4_10 + [y^4_13] + x^5_0 + k1_7 + k2_7_2 + k3_7_2= 0
[y^4_1] + [y^4_11] + y^4_14 + x^5_1 + k1_3 + k2_3_2 + k3_3_2= 0
[y^4_2] + [y^4_8] + x^5_14 + k1_1 + k2_1_2 + k3_1_2= 0
[y^4_3] + y^4_9 + [x^5_15] + k1_6 + k2_6_2 + k3_6_2= 0
y^4_6 + y^4_9 + x^5_11 + k1_2 + k2_2_2 + k3_2_2= 0
y^5_0 + [y^5_10] + [x^6_12] + k1_11 + k2_11_2 + k3_11_2= 0
y^5_1 + y^5_11 + y^5_14 + x^6_1 + k1_13 + k2_13_2 + k3_13_2= 0
[y^5_6] + [y^5_9] + x^6_11 + k1_8 + k2_8_2 + k3_8_2= 0
y^6_1 + y^6_11 + [y^6_14] + [x^7_1] + k1_5 + k2_5_3 + k3_5_3= 0
S(x^3_5) + y^3_5= 0
S(x^3_13) + y^3_13= 0
S(x^4_6) + y^4_6= 0
S(x^4_10) + y^4_10= 0
S(x^4_14) + y^4_14= 0
S(x^5_0) + y^5_0= 0
S(x^5_1) + y^5_1= 0
S(x^5_11) + y^5_11= 0
S(x^5_14) + y^5_14= 0
S(x^6_1) + y^6_1= 0
S(x^6_11) + y^6_11= 0

the 1 th Minimal Constraint set is:

y^1_1 + x^2_5 + k1_15 + k2_15_0 + k3_15_0= 0
y^1_1 + y^1_11 + x^2_13 + k1_15 + k2_15_0 + k3_15_0= 0
y^1_3 + y^1_9 + [y^1_12] + [x^2_3] + k1_13 + k2_13_0 + k3_13_0= 0
y^1_3 + y^1_9 + x^2_15 + k1_13 + k2_13_0 + k3_13_0= 0
[y^1_4] + y^1_11 + [x^2_9] + k1_10 + k2_10_0 + k3_10_0= 0
[y^2_0] + y^2_10 + y^2_13 + [x^3_0] + k1_1 + k2_1_1 + k3_1_1= 0
[y^2_0] + y^2_10 + [x^3_12] + k1_1 + k2_1_1 + k3_1_1= 0
y^2_2 + y^2_8 + y^2_15 + x^3_2 + k1_0 + k2_0_1 + k3_0_1= 0
y^2_2 + x^3_6 + k1_0 + k2_0_1 + k3_0_1= 0
y^2_5 + y^2_8 + x^3_10 + k1_6 + k2_6_1 + k3_6_1= 0
y^3_2 + x^4_6 + k1_9 + k2_9_1 + k3_9_1= 0
y^3_6 + [y^3_9] + [x^4_11] + k1_10 + k2_10_1 + k3_10_1= 0

[y^3_7] + y^3_10 + [x^4_8] + k1_13 + k2_13_1 + k3_13_1= 0
[y^4_3] + y^4_9 + [x^5_15] + k1_6 + k2_6_2 + k3_6_2= 0
y^4_6 + y^4_9 + x^5_11 + k1_2 + k2_2_2 + k3_2_2= 0
[y^5_4] + y^5_11 + [x^6_9] + k1_9 + k2_9_2 + k3_9_2= 0
S(x^2_5) + y^2_5= 0
S(x^2_13) + y^2_13= 0
S(x^2_15) + y^2_15= 0
S(x^3_2) + y^3_2= 0
S(x^3_6) + y^3_6= 0
S(x^3_10) + y^3_10= 0
S(x^4_6) + y^4_6= 0
S(x^5_11) + y^5_11= 0
the 2 th Minimal Constraint set is:
y^1_1 + x^2_5 + k1_15 + k2_15_0 + k3_15_0= 0
y^1_1 + y^1_11 + x^2_13 + k1_15 + k2_15_0 + k3_15_0= 0
y^1_3 + y^1_9 + [y^1_12] + [x^2_3] + k1_13 + k2_13_0 + k3_13_0= 0
y^1_3 + y^1_9 + x^2_15 + k1_13 + k2_13_0 + k3_13_0= 0
[y^1_4] + y^1_11 + [x^2_9] + k1_10 + k2_10_0 + k3_10_0= 0
[y^2_0] + y^2_10 + y^2_13 + [x^3_0] + k1_1 + k2_1_1 + k3_1_1= 0
[y^2_0] + y^2_10 + [x^3_12] + k1_1 + k2_1_1 + k3_1_1= 0
y^2_1 + x^3_5 + k1_7 + k2_7_1 + k3_7_1= 0
y^2_1 + y^2_11 + x^3_13 + k1_7 + k2_7_1 + k3_7_1= 0
y^2_2 + y^2_8 + y^2_15 + x^3_2 + k1_0 + k2_0_1 + k3_0_1= 0
y^2_2 + x^3_6 + k1_0 + k2_0_1 + k3_0_1= 0
[y^2_3] + [y^2_9] + [y^2_12] + x^3_3 + k1_5 + k2_5_1 + k3_5_1= 0
[y^2_4] + y^2_11 + [x^3_9] + k1_2 + k2_2_1 + k3_2_1= 0
y^2_5 + y^2_8 + x^3_10 + k1_6 + k2_6_1 + k3_6_1= 0
[y^3_0] + y^3_10 + y^3_13 + [x^4_0] + k1_15 + k2_15_1 + k3_15_1= 0
y^3_2 + y^3_8 + x^4_14 + k1_9 + k2_9_1 + k3_9_1= 0
y^3_3 + x^4_7 + k1_14 + k2_14_1 + k3_14_1= 0
y^3_5 + y^3_8 + x^4_10 + k1_12 + k2_12_1 + k3_12_1= 0
y^3_6 + [y^3_9] + [x^4_11] + k1_10 + k2_10_1 + k3_10_1= 0
[y^4_1] + [y^4_11] + y^4_14 + x^5_1 + k1_3 + k2_3_2 + k3_3_2= 0
y^4_7 + y^4_10 + x^5_8 + k1_5 + k2_5_2 + k3_5_2= 0
y^5_1 + x^6_5 + k1_13 + k2_13_2 + k3_13_2= 0
[y^5_2] + y^5_8 + [y^5_15] + x^6_2 + k1_15 + k2_15_2 + k3_15_2= 0
[y^5_3] + [y^5_9] + x^6_15 + k1_12 + k2_12_2 + k3_12_2= 0
y^6_2 + y^6_8 + y^6_15 + x^7_2 + k1_7 + k2_7_3 + k3_7_3= 0
y^6_5 + y^6_8 + x^7_10 + k1_2 + k2_2_3 + k3_2_3= 0
[y^6_7] + [y^6_10] + x^7_8 + k1_6 + k2_6_3 + k3_6_3= 0
y^7_2 + y^7_8 + [y^7_15] + [x^8_2] + k1_11 + k2_11_3 + k3_11_3= 0
[y^7_7] + y^7_10 + [x^8_8] + k1_12 + k2_12_3 + k3_12_3= 0
S(x^2_5) + y^2_5= 0
S(x^2_13) + y^2_13= 0

S(x^2_15) + y^2_15= 0
S(x^3_2) + y^3_2= 0
S(x^3_3) + y^3_3= 0
S(x^3_5) + y^3_5= 0
S(x^3_6) + y^3_6= 0
S(x^3_10) + y^3_10= 0
S(x^3_13) + y^3_13= 0
S(x^4_7) + y^4_7= 0
S(x^4_10) + y^4_10= 0
S(x^4_14) + y^4_14= 0
S(x^5_1) + y^5_1= 0
S(x^5_8) + y^5_8= 0
S(x^6_2) + y^6_2= 0
S(x^6_5) + y^6_5= 0
S(x^6_15) + y^6_15= 0
S(x^7_2) + y^7_2= 0
S(x^7_8) + y^7_8= 0
S(x^7_10) + y^7_10= 0
the 3 th Minimal Constraint set is:
[y^2_3] + [y^2_9] + [y^2_12] + x^3_3 + k1_5 + k2_5_1 + k3_5_1= 0
y^3_3 + x^4_7 + k1_14 + k2_14_1 + k3_14_1= 0
[y^4_0] + y^4_10 + [y^4_13] + x^5_0 + k1_7 + k2_7_2 + k3_7_2= 0
y^4_7 + y^4_10 + x^5_8 + k1_5 + k2_5_2 + k3_5_2= 0
y^5_0 + [y^5_10] + [x^6_12] + k1_11 + k2_11_2 + k3_11_2= 0
[y^5_2] + y^5_8 + [y^5_15] + x^6_2 + k1_15 + k2_15_2 + k3_15_2= 0
[y^5_3] + [y^5_9] + x^6_15 + k1_12 + k2_12_2 + k3_12_2= 0
[y^5_7] + [y^5_10] + x^6_8 + k1_14 + k2_14_2 + k3_14_2= 0
y^6_2 + y^6_8 + y^6_15 + x^7_2 + k1_7 + k2_7_3 + k3_7_3= 0
[y^6_7] + [y^6_10] + x^7_8 + k1_6 + k2_6_3 + k3_6_3= 0
y^7_2 + y^7_8 + [y^7_15] + [x^8_2] + k1_11 + k2_11_3 + k3_11_3= 0
S(x^3_3) + y^3_3= 0
S(x^4_7) + y^4_7= 0
S(x^5_0) + y^5_0= 0
S(x^5_8) + y^5_8= 0
S(x^6_2) + y^6_2= 0
S(x^6_8) + y^6_8= 0
S(x^6_15) + y^6_15= 0
S(x^7_2) + y^7_2= 0
S(x^7_8) + y^7_8= 0
the 4 th Minimal Constraint set is:
[y^4_1] + [y^4_11] + x^5_13 + k1_3 + k2_3_2 + k3_3_2= 0
y^5_0 + [y^5_10] + y^5_13 + [x^6_0] + k1_11 + k2_11_2 + k3_11_2= 0
y^5_0 + [y^5_10] + [x^6_12] + k1_11 + k2_11_2 + k3_11_2= 0
S(x^5_13) + y^5_13= 0

the 5 th Minimal Constraint set is:

[y^2_3] + [y^2_9] + [y^2_12] + x^3_3 + k1_5 + k2_5_1 + k3_5_1= 0

y^3_3 + x^4_7 + k1_14 + k2_14_1 + k3_14_1= 0

[y^4_0] + y^4_10 + [y^4_13] + x^5_0 + k1_7 + k2_7_2 + k3_7_2= 0

y^4_7 + y^4_10 + x^5_8 + k1_5 + k2_5_2 + k3_5_2= 0

y^5_0 + [y^5_10] + [x^6_12] + k1_11 + k2_11_2 + k3_11_2= 0

[y^5_5] + y^5_8 + [x^6_10] + k1_10 + k2_10_2 + k3_10_2= 0

S(x^3_3) + y^3_3= 0

S(x^4_7) + y^4_7= 0

S(x^5_0) + y^5_0= 0

S(x^5_8) + y^5_8= 0

the 6 th Minimal Constraint set is:

[y^2_3] + [y^2_9] + [y^2_12] + x^3_3 + k1_5 + k2_5_1 + k3_5_1= 0

y^3_3 + x^4_7 + k1_14 + k2_14_1 + k3_14_1= 0

[y^4_0] + y^4_10 + [y^4_13] + x^5_0 + k1_7 + k2_7_2 + k3_7_2= 0

y^4_7 + y^4_10 + x^5_8 + k1_5 + k2_5_2 + k3_5_2= 0

y^5_0 + [y^5_10] + [x^6_12] + k1_11 + k2_11_2 + k3_11_2= 0

[y^5_2] + y^5_8 + [x^6_14] + k1_15 + k2_15_2 + k3_15_2= 0

S(x^3_3) + y^3_3= 0

S(x^4_7) + y^4_7= 0

S(x^5_0) + y^5_0= 0

S(x^5_8) + y^5_8= 0

the 7 th Minimal Constraint set is:

[y^4_0] + y^4_10 + [y^4_13] + x^5_0 + k1_7 + k2_7_2 + k3_7_2= 0

[y^4_0] + y^4_10 + [x^5_12] + k1_7 + k2_7_2 + k3_7_2= 0

y^5_0 + [y^5_10] + [x^6_12] + k1_11 + k2_11_2 + k3_11_2= 0

S(x^5_0) + y^5_0= 0

the 8 th Minimal Constraint set is:

y^1_1 + x^2_5 + k1_15 + k2_15_0 + k3_15_0= 0

y^1_1 + y^1_11 + x^2_13 + k1_15 + k2_15_0 + k3_15_0= 0

y^1_3 + y^1_9 + [y^1_12] + [x^2_3] + k1_13 + k2_13_0 + k3_13_0= 0

y^1_3 + y^1_9 + x^2_15 + k1_13 + k2_13_0 + k3_13_0= 0

[y^1_4] + y^1_11 + [x^2_9] + k1_10 + k2_10_0 + k3_10_0= 0

[y^2_0] + y^2_10 + y^2_13 + [x^3_0] + k1_1 + k2_1_1 + k3_1_1= 0

[y^2_0] + y^2_10 + [x^3_12] + k1_1 + k2_1_1 + k3_1_1= 0

y^2_1 + x^3_5 + k1_7 + k2_7_1 + k3_7_1= 0

y^2_1 + y^2_11 + x^3_13 + k1_7 + k2_7_1 + k3_7_1= 0

y^2_2 + y^2_8 + y^2_15 + x^3_2 + k1_0 + k2_0_1 + k3_0_1= 0

y^2_2 + x^3_6 + k1_0 + k2_0_1 + k3_0_1= 0

[y^2_4] + y^2_11 + [x^3_9] + k1_2 + k2_2_1 + k3_2_1= 0

y^2_5 + y^2_8 + x^3_10 + k1_6 + k2_6_1 + k3_6_1= 0

[y^3_0] + y^3_10 + y^3_13 + [x^4_0] + k1_15 + k2_15_1 + k3_15_1= 0

y^3_2 + y^3_8 + [y^3_15] + [x^4_2] + k1_9 + k2_9_1 + k3_9_1= 0

y^3_5 + y^3_8 + x^4_10 + k1_12 + k2_12_1 + k3_12_1= 0

y^3_6 + [y^3_9] + [x^4_11] + k1_10 + k2_10_1 + k3_10_1= 0
[y^4_0] + y^4_10 + [y^4_13] + x^5_0 + k1_7 + k2_7_2 + k3_7_2= 0
y^5_0 + [y^5_10] + [x^6_12] + k1_11 + k2_11_2 + k3_11_2= 0
S(x^2_5) + y^2_5= 0
S(x^2_13) + y^2_13= 0
S(x^2_15) + y^2_15= 0
S(x^3_2) + y^3_2= 0
S(x^3_5) + y^3_5= 0
S(x^3_6) + y^3_6= 0
S(x^3_10) + y^3_10= 0
S(x^3_13) + y^3_13= 0
S(x^4_10) + y^4_10= 0
S(x^5_0) + y^5_0= 0
the 9 th Minimal Constraint set is:
[y^3_4] + [y^3_11] + x^4_9 + k1_8 + k2_8_1 + k3_8_1= 0
[y^4_3] + y^4_9 + [x^5_15] + k1_6 + k2_6_2 + k3_6_2= 0
S(x^4_9) + y^4_9= 0
the 10 th Minimal Constraint set is:
[y^4_3] + y^4_9 + [y^4_12] + [x^5_3] + k1_6 + k2_6_2 + k3_6_2= 0
[y^4_3] + y^4_9 + [x^5_15] + k1_6 + k2_6_2 + k3_6_2= 0
the 11 th Minimal Constraint set is:
y^1_1 + x^2_5 + k1_15 + k2_15_0 + k3_15_0= 0
y^1_1 + y^1_11 + x^2_13 + k1_15 + k2_15_0 + k3_15_0= 0
[y^1_4] + y^1_11 + [x^2_9] + k1_10 + k2_10_0 + k3_10_0= 0
[y^2_0] + y^2_10 + y^2_13 + [x^3_0] + k1_1 + k2_1_1 + k3_1_1= 0
[y^2_0] + y^2_10 + [x^3_12] + k1_1 + k2_1_1 + k3_1_1= 0
y^2_2 + x^3_6 + k1_0 + k2_0_1 + k3_0_1= 0
y^2_2 + y^2_8 + x^3_14 + k1_0 + k2_0_1 + k3_0_1= 0
y^2_5 + y^2_8 + x^3_10 + k1_6 + k2_6_1 + k3_6_1= 0
y^3_1 + [y^3_11] + y^3_14 + [x^4_1] + k1_11 + k2_11_1 + k3_11_1= 0
y^3_1 + x^4_5 + k1_11 + k2_11_1 + k3_11_1= 0
y^3_6 + [y^3_9] + [x^4_11] + k1_10 + k2_10_1 + k3_10_1= 0
[y^3_7] + y^3_10 + [x^4_8] + k1_13 + k2_13_1 + k3_13_1= 0
y^4_5 + [y^4_8] + [x^5_10] + k1_4 + k2_4_2 + k3_4_2= 0
S(x^2_5) + y^2_5= 0
S(x^2_13) + y^2_13= 0
S(x^3_6) + y^3_6= 0
S(x^3_10) + y^3_10= 0
S(x^3_14) + y^3_14= 0
S(x^4_5) + y^4_5= 0
the 12 th Minimal Constraint set is:
y^1_1 + x^2_5 + k1_15 + k2_15_0 + k3_15_0= 0
y^1_1 + y^1_11 + x^2_13 + k1_15 + k2_15_0 + k3_15_0= 0
[y^1_4] + y^1_11 + [x^2_9] + k1_10 + k2_10_0 + k3_10_0= 0

[y^2_0] + y^2_10 + y^2_13 + [x^3_0] + k1_1 + k2_1_1 + k3_1_1= 0
[y^2_0] + y^2_10 + [x^3_12] + k1_1 + k2_1_1 + k3_1_1= 0
y^2_2 + x^3_6 + k1_0 + k2_0_1 + k3_0_1= 0
y^2_2 + y^2_8 + x^3_14 + k1_0 + k2_0_1 + k3_0_1= 0
y^2_5 + y^2_8 + x^3_10 + k1_6 + k2_6_1 + k3_6_1= 0
y^3_1 + [y^3_11] + y^3_14 + [x^4_1] + k1_11 + k2_11_1 + k3_11_1= 0
y^3_1 + [y^3_11] + [x^4_13] + k1_11 + k2_11_1 + k3_11_1= 0
y^3_6 + [y^3_9] + [x^4_11] + k1_10 + k2_10_1 + k3_10_1= 0
[y^3_7] + y^3_10 + [x^4_8] + k1_13 + k2_13_1 + k3_13_1= 0
S(x^2_5) + y^2_5= 0
S(x^2_13) + y^2_13= 0
S(x^3_6) + y^3_6= 0
S(x^3_10) + y^3_10= 0
S(x^3_14) + y^3_14= 0
the 13 th Minimal Constraint set is:
[y^3_0] + y^3_10 + [x^4_12] + k1_15 + k2_15_1 + k3_15_1= 0
[y^3_7] + y^3_10 + [x^4_8] + k1_13 + k2_13_1 + k3_13_1= 0
the 14 th Minimal Constraint set is:
[y^2_3] + [y^2_9] + [y^2_12] + x^3_3 + k1_5 + k2_5_1 + k3_5_1= 0
y^3_3 + [y^3_9] + [x^4_15] + k1_14 + k2_14_1 + k3_14_1= 0
S(x^3_3) + y^3_3= 0
the 15 th Minimal Constraint set is:
[y^2_3] + [y^2_9] + [y^2_12] + x^3_3 + k1_5 + k2_5_1 + k3_5_1= 0
y^3_3 + [y^3_9] + [y^3_12] + [x^4_3] + k1_14 + k2_14_1 + k3_14_1= 0
S(x^3_3) + y^3_3= 0
the 16 th Minimal Constraint set is:
[y^0_0] + [x^1_4] + k1_0 + k2_0_0 + k3_0_0= 0
the 17 th Minimal Constraint set is:
[y^1_0] + [x^2_4] + k1_9 + k2_9_0 + k3_9_0= 0
the 18 th Minimal Constraint set is:
[y^2_0] + [x^3_4] + k1_1 + k2_1_1 + k3_1_1= 0
the 19 th Minimal Constraint set is:
[y^2_3] + [x^3_7] + k1_5 + k2_5_1 + k3_5_1= 0
the 20 th Minimal Constraint set is:
[y^2_3] + [y^2_9] + [x^3_15] + k1_5 + k2_5_1 + k3_5_1= 0
the 21 th Minimal Constraint set is:
[y^3_0] + [x^4_4] + k1_15 + k2_15_1 + k3_15_1= 0
the 22 th Minimal Constraint set is:
[y^4_0] + [x^5_4] + k1_7 + k2_7_2 + k3_7_2= 0
the 23 th Minimal Constraint set is:
[y^4_1] + [x^5_5] + k1_3 + k2_3_2 + k3_3_2= 0
the 24 th Minimal Constraint set is:
[y^4_2] + [y^4_8] + [y^4_15] + [x^5_2] + k1_1 + k2_1_2 + k3_1_2= 0
the 25 th Minimal Constraint set is:

[y^4_2] + [x^5_6] + k1_1 + k2_1_2 + k3_1_2= 0
the 26 th Minimal Constraint set is:
[y^4_3] + [x^5_7] + k1_6 + k2_6_2 + k3_6_2= 0
the 27 th Minimal Constraint set is:
[y^4_4] + [y^4_11] + [x^5_9] + k1_0 + k2_0_2 + k3_0_2= 0
the 28 th Minimal Constraint set is:
[y^5_2] + [x^6_6] + k1_15 + k2_15_2 + k3_15_2= 0
the 29 th Minimal Constraint set is:
[y^5_3] + [y^5_9] + [y^5_12] + [x^6_3] + k1_12 + k2_12_2 + k3_12_2= 0
the 30 th Minimal Constraint set is:
[y^5_3] + [x^6_7] + k1_12 + k2_12_2 + k3_12_2= 0
the 31 th Minimal Constraint set is:
[y^6_0] + [x^7_4] + k1_3 + k2_3_3 + k3_3_3= 0
the 32 th Minimal Constraint set is:
[y^6_3] + [x^7_7] + k1_4 + k2_4_3 + k3_4_3= 0
the 33 th Minimal Constraint set is:
[y^6_3] + [y^6_9] + [x^7_15] + k1_4 + k2_4_3 + k3_4_3= 0
the 34 th Minimal Constraint set is:
[y^6_6] + [y^6_9] + [x^7_11] + k1_0 + k2_0_3 + k3_0_3= 0
the 35 th Minimal Constraint set is:
[y^7_1] + [x^8_5] + k1_14 + k2_14_3 + k3_14_3= 0
the 36 th Minimal Constraint set is:
[y^8_2] + [x^9_6] + k1_3 + k2_3_4 + k3_3_4= 0
the 37 th Minimal Constraint set is:
S([x^0_0]) + [y^0_0]= 0