

We introduce the structure constants of sl2
We show the Killing-Cartan metric

```
-8.00 0.00 0.00
0.00 8.00 0.00
0.00 0.00 8.00
```

and its determinant
-512.0

In what follows we expand sl2 with all the abelian semigroups of order 6 having zero element and a resonance; and identify the ones that leads to a semisimple algebra.

A semisimple algebra has been found, expanding with the semigroup #12097

```
1 1 1 1 1 1
1 2 1 1 1 6
1 1 3 3 3 1
1 1 3 4 5 1
1 1 3 5 4 1
1 6 1 1 1 2
```

which has the zero element 1 and the resonance:

S0: 1 2 3 4

S1: 1 3 5 6

The metric of the reduction of the resonant subalgebra is:

```
-8.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
0.00 -8.00 -8.00 0.00 0.00 0.00 0.00 0.00 0.00
0.00 -8.00 -16.00 0.00 0.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 8.00 8.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 8.00 16.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 0.00 8.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 0.00 0.00 8.00 8.00 0.00
0.00 0.00 0.00 0.00 0.00 0.00 8.00 16.00 0.00
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 8.00
```

and its determinant

-1.34217728E8

A semisimple algebra has been found, expanding with the semigroup #12151

```
1 1 1 1 1 1
1 2 1 1 2 2
1 1 3 1 3 3
1 1 1 4 4 4
1 2 3 4 5 6
1 2 3 4 6 5
```

which has the zero element 1 and the resonance:

S0: 1 2 3 4 5

S1: 1 2 3 4 6

The metric of the reduction of the resonant subalgebra is:

```

-8.00 0.00 0.00 -8.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
0.00 -8.00 0.00 -8.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
0.00 0.00 -8.00 -8.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
-8.00 -8.00 -8.00 -32.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 8.00 0.00 0.00 8.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 0.00 8.00 0.00 8.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 0.00 0.00 8.00 8.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 8.00 8.00 8.00 32.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 8.00 0.00 0.00 8.00
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 8.00 0.00 8.00
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 8.00 8.00
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 8.00 8.00 8.00 32.00

```

and its determinant

6.8719476736E10

A semisimple algebra has been found, expanding with the semigroup #12218

```

1 1 1 1 1 1
1 2 1 1 2 2
1 1 3 3 3 3
1 1 3 4 4 4
1 2 3 4 5 6
1 2 3 4 6 5

```

which has the zero element 1 and the resonance:

S0: 1 2 3 4 5

S1: 1 2 3 4 6

The metric of the reduction of the resonant subalgebra is:

```

-8.00 0.00 0.00 -8.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
0.00 -8.00 -8.00 -8.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
0.00 -8.00 -16.00 -16.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
-8.00 -8.00 -16.00 -32.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 8.00 0.00 0.00 8.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 0.00 8.00 8.00 8.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 0.00 8.00 16.00 16.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 8.00 8.00 16.00 32.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 8.00 0.00 0.00 8.00
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 8.00 8.00 8.00
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 8.00 16.00 16.00
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 8.00 8.00 16.00 32.00

```

and its determinant

6.8719476736E10

A semisimple algebra has been found, expanding with the semigroup #12262

```

1 1 1 1 1 1
1 2 1 1 2 2
1 1 3 4 3 4
1 1 4 3 4 3
1 2 3 4 5 6
1 2 4 3 6 5

```

which has the zero element 1 and the resonance:

S0: 1 2 3 5

S1: 1 2 4 6

The metric of the reduction of the resonant subalgebra is:

```

-8.00 0.00 -8.00 0.00 0.00 0.00 0.00 0.00 0.00
0.00 -8.00 -8.00 0.00 0.00 0.00 0.00 0.00 0.00
-8.00 -8.00 -24.00 0.00 0.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 8.00 0.00 8.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 8.00 8.00 0.00 0.00 0.00
0.00 0.00 0.00 8.00 8.00 24.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 0.00 0.00 8.00 0.00 8.00
0.00 0.00 0.00 0.00 0.00 0.00 0.00 8.00 8.00
0.00 0.00 0.00 0.00 0.00 0.00 8.00 8.00 24.00

```

and its determinant

-1.34217728E8

A semisimple algebra has been found, expanding with the semigroup #12400

```

1 1 1 1 1 1
1 2 1 2 2 2
1 1 3 3 3 3
1 2 3 4 4 4
1 2 3 4 5 6
1 2 3 4 6 5

```

which has the zero element 1 and the resonance:

S0: 1 2 3 4 5

S1: 1 2 3 4 6

The metric of the reduction of the resonant subalgebra is:

```

-8.00 0.00 -8.00 -8.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
0.00 -8.00 -8.00 -8.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
-8.00 -8.00 -24.00 -24.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
-8.00 -8.00 -24.00 -32.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 8.00 0.00 8.00 8.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 0.00 8.00 8.00 8.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 8.00 8.00 24.00 24.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 8.00 8.00 24.00 32.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 8.00 0.00 8.00 8.00
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 8.00 8.00 8.00
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 8.00 8.00 24.00 24.00
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 8.00 8.00 24.00 32.00

```

and its determinant

6.8719476736E10

A semisimple algebra has been found, expanding with the semigroup #13679

```

1 1 1 1 1 1
1 2 2 2 2 2
1 2 3 2 2 6
1 2 2 4 5 2
1 2 2 5 4 2
1 2 6 2 2 3

```

which has the zero element 1 and the resonance:

S0: 1 2 3 4

S1: 1 2 5 6

The metric of the reduction of the resonant subalgebra is:

```

-8.00 -8.00 -8.00 0.00 0.00 0.00 0.00 0.00 0.00
-8.00 -16.00 -8.00 0.00 0.00 0.00 0.00 0.00 0.00
-8.00 -8.00 -16.00 0.00 0.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 8.00 8.00 8.00 0.00 0.00 0.00
0.00 0.00 0.00 8.00 16.00 8.00 0.00 0.00 0.00
0.00 0.00 0.00 8.00 8.00 16.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 0.00 0.00 8.00 8.00 8.00
0.00 0.00 0.00 0.00 0.00 0.00 8.00 16.00 8.00
0.00 0.00 0.00 0.00 0.00 0.00 8.00 8.00 16.00

```

and its determinant

-1.34217728E8

A semisimple algebra has been found, expanding with the semigroup #13688

```

1 1 1 1 1 1
1 2 2 2 2 2
1 2 3 2 3 3
1 2 2 4 4 4
1 2 3 4 5 6
1 2 3 4 6 5

```

which has the zero element 1 and the resonance:

S0: 1 2 3 4 5

S1: 1 2 3 4 6

The metric of the reduction of the resonant subalgebra is:

```

-8.00 -8.00 -8.00 -8.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
-8.00 -16.00 -8.00 -16.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
-8.00 -8.00 -16.00 -16.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
-8.00 -16.00 -16.00 -32.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 8.00 8.00 8.00 8.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 8.00 16.00 8.00 16.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 8.00 8.00 16.00 16.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 8.00 16.00 16.00 32.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 8.00 8.00 8.00 8.00
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 8.00 16.00 8.00 16.00
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 8.00 8.00 16.00 16.00
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 8.00 16.00 16.00 32.00

```

and its determinant

6.8719476736E10

A semisimple algebra has been found, expanding with the semigroup #13831

```

1 1 1 1 1 1
1 2 2 2 2 2
1 2 3 3 3 3
1 2 3 4 4 4
1 2 3 4 5 6
1 2 3 4 6 5

```

which has the zero element 1 and the resonance:

S0: 1 2 3 4 5

S1: 1 2 3 4 6

The metric of the reduction of the resonant subalgebra is:

```

-8.00 -8.00 -8.00 -8.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
-8.00 -16.00 -16.00 -16.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
-8.00 -16.00 -24.00 -24.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
-8.00 -16.00 -24.00 -32.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 8.00 8.00 8.00 8.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 8.00 16.00 16.00 16.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 8.00 16.00 24.00 24.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 8.00 16.00 24.00 32.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 8.00 8.00 8.00 8.00
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 8.00 16.00 16.00 16.00
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 8.00 16.00 24.00 24.00
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 8.00 16.00 24.00 32.00

```

and its determinant

6.8719476736E10

A semisimple algebra has been found, expanding with the semigroup #13877

```

1 1 1 1 1 1
1 2 2 2 2 2
1 2 3 3 5 5
1 2 3 4 5 6
1 2 5 5 3 3
1 2 5 6 3 4

```

which has the zero element 1 and the resonance:

S0: 1 2 3 4

S1: 1 2 5 6

The metric of the reduction of the resonant subalgebra is:

```

-8.00 -8.00 -8.00 0.00 0.00 0.00 0.00 0.00 0.00
-8.00 -16.00 -16.00 0.00 0.00 0.00 0.00 0.00 0.00
-8.00 -16.00 -24.00 0.00 0.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 8.00 8.00 8.00 0.00 0.00 0.00
0.00 0.00 0.00 8.00 16.00 16.00 0.00 0.00 0.00
0.00 0.00 0.00 8.00 16.00 24.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 0.00 0.00 8.00 8.00 8.00
0.00 0.00 0.00 0.00 0.00 0.00 8.00 16.00 16.00
0.00 0.00 0.00 0.00 0.00 0.00 8.00 16.00 24.00

```

and its determinant

-1.34217728E8

A semisimple algebra has been found, expanding with the semigroup #13899

```

1 1 1 1 1 1
1 2 2 2 2 2
1 2 3 4 5 6
1 2 4 3 6 5
1 2 5 6 3 4
1 2 6 5 4 3

```

which has the zero element 1 and the resonance:

S0: 1 2 3 6

S1: 1 2 4 5

The metric of the reduction of the resonant subalgebra is:

```

-8.00 -8.00 -8.00 0.00 0.00 0.00 0.00 0.00 0.00
-8.00 -24.00 -8.00 0.00 0.00 0.00 0.00 0.00 0.00
-8.00 -8.00 -24.00 0.00 0.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 8.00 8.00 8.00 0.00 0.00 0.00
0.00 0.00 0.00 8.00 24.00 8.00 0.00 0.00 0.00
0.00 0.00 0.00 8.00 8.00 24.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 0.00 0.00 8.00 8.00 8.00
0.00 0.00 0.00 0.00 0.00 0.00 8.00 24.00 8.00
0.00 0.00 0.00 0.00 0.00 0.00 8.00 8.00 24.00

```

and its determinant

-8.589934592E9

A semisimple algebra has been found, expanding with the semigroup #13900

```

1 1 1 1 1 1
1 2 2 2 2 2
1 2 3 4 5 6
1 2 4 3 6 5
1 2 5 6 4 3
1 2 6 5 3 4

```

which has the zero element 1 and the resonance:

S0: 1 2 3 4

S1: 1 2 5 6

The metric of the reduction of the resonant subalgebra is:

```

-8.00 -8.00 -8.00 0.00 0.00 0.00 0.00 0.00 0.00
-8.00 -24.00 -8.00 0.00 0.00 0.00 0.00 0.00 0.00
-8.00 -8.00 -24.00 0.00 0.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 8.00 8.00 8.00 0.00 0.00 0.00
0.00 0.00 0.00 8.00 8.00 24.00 0.00 0.00 0.00
0.00 0.00 0.00 8.00 24.00 8.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 0.00 0.00 8.00 8.00 8.00
0.00 0.00 0.00 0.00 0.00 0.00 8.00 8.00 24.00
0.00 0.00 0.00 0.00 0.00 0.00 8.00 24.00 8.00

```

and its determinant

-8.589934592E9

A semisimple algebra has been found, expanding with the semigroup #14212

```

1 1 1 1 1 1
1 2 2 2 5 6
1 2 3 4 5 6
1 2 4 3 5 6
1 5 5 5 6 2
1 6 6 6 2 5

```

which has the zero element 1 and the resonance:

S0: 1 2 3 5 6

S1: 1 2 4 5 6

The metric of the reduction of the resonant subalgebra is:

```

-24.00 -24.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
-24.00 -32.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 -24.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
0.00 0.00 -24.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 24.00 24.00 0.00 0.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 24.00 32.00 0.00 0.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 0.00 0.00 0.00 24.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 0.00 0.00 24.00 0.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 24.00 24.00 0.00 0.00
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 24.00 32.00 0.00 0.00
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 24.00
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 24.00 0.00

```

and its determinant
-1.352605460594688E15

There are 1465 semigroups of order 6 with zero element and at least one resonant decomposition.
In total, there are 20680 different resonant decompositions.
And 12 of them leads to a semisimple algebra.
There are 0 semigroups with zero element, having more than one resonance and leading to semisimple algebras with all those resonances.