

# Tigers OX Server Manual

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# 1 TIGERS Functions

This chapter describes interface functions for tigers ox server `ox_sm1_tigers`.

## 1.0.1 tigers.tigers

`tigers.tigers(a|proc=a)`

:: It asks the **tigers** server of the descriptor number  $p$  to enumerate all Grobner bases associated to the toric variety defined by the matrix  $a$ .

*return*      List

$p$             Number

$a$             List

- It asks the **tigers** server of the descriptor number  $p$  to enumerate all Grobner bases associated to the toric variety defined by the matrix  $a$ .
- The system tigers is an expert system to enumerate all Gröbner bases of affine toric ideals. In other words, it can be used to determine the state polytope of a given affine toric ideal. As to a theoretical background, see the book  
B.Sturmfels, Grobner bases and Convex Polytopes.

The original tigers is written by Birk Hubert. The algorithm used is explained in the paper

B.Huber and R.Thomas, Computing Grobner Fans of Toric Ideals.

```
[395] A=[[1,1,1,1],[0,1,2,3]]$
```

```
[306] S=tigers.tigers(A)$
```

```
[307] length(S);
```

```
8
```

```
[308] S[0];
```

```
[[[1,0,1,0],[0,2,0,0]],[[1,0,0,1],[0,1,1,0]],[[0,1,0,1],[0,0,2,0]]]
```

```
[309] S[1];
```

```
[[[1,0,0,1],[0,1,1,0]],[[0,2,0,0],[1,0,1,0]],[[0,1,0,1],[0,0,2,0]]]
```

In this example, all reduced Grobner bases for the toric ideal associated to the matrix  $A$  are stored in  $S$ . There are eight distinct Grobner bases of  $A$ .  $[[i-1, i-2, \dots], [j-1, j-2, \dots]]$  is a set of exponents of two monomials and stands for a binomial. For example, the  $S[0]$  consists of

$x_1 x_3 - x_2^2$ ,  $x_1 x_4 - x_2 x_3$ ,  $x_2 x_4 - x_3^2$ .

$\langle x_1 x_3, x_1 x_4, x_2 x_4 \rangle$  is the initial ideal of  $S[0]$ .

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