

# 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 Grobner 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 in 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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