

Tigers OX Server Manual

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OpenXM.org

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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