2110561 COMPFAB

assignment 2

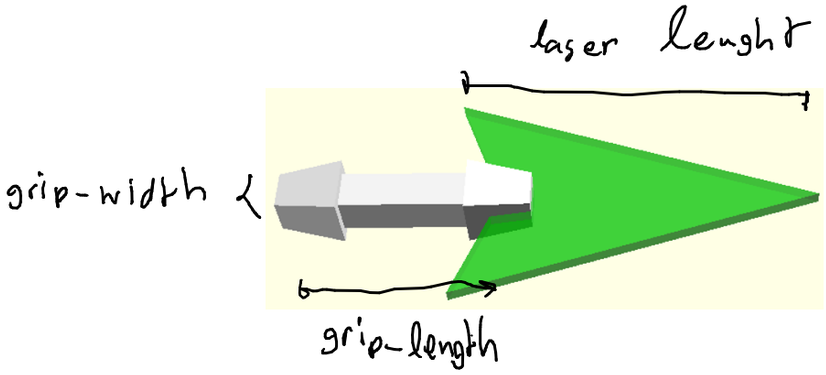
OPENSCAD

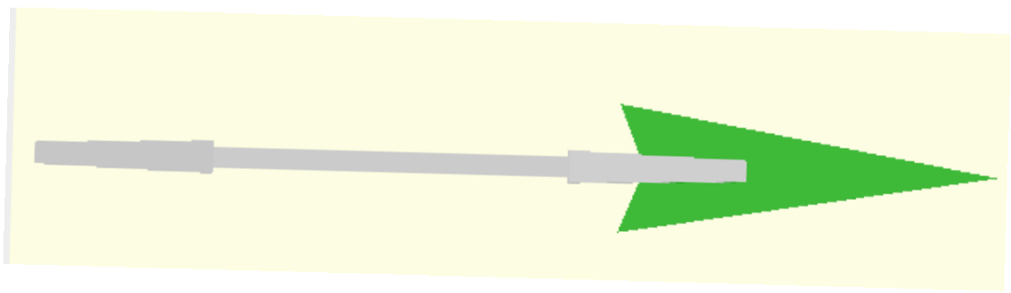
Jan 10, 2021

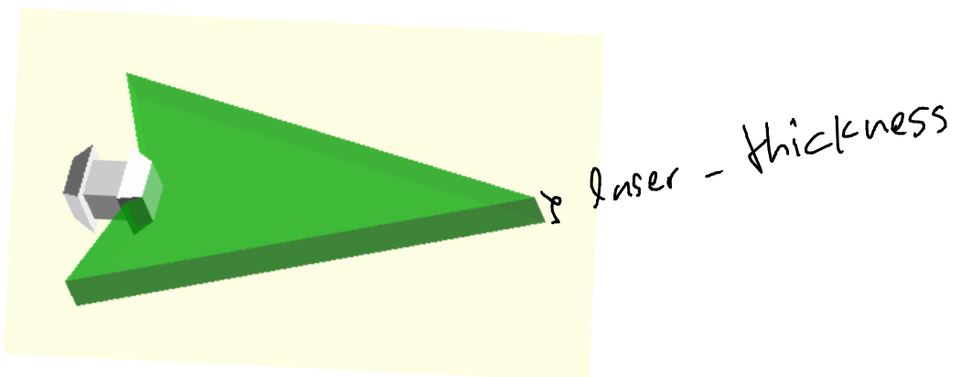
6372096621

Model 1: Z-saber

```
zsaber(grip_length,grip_width,laser_length,laser_thickness);
```





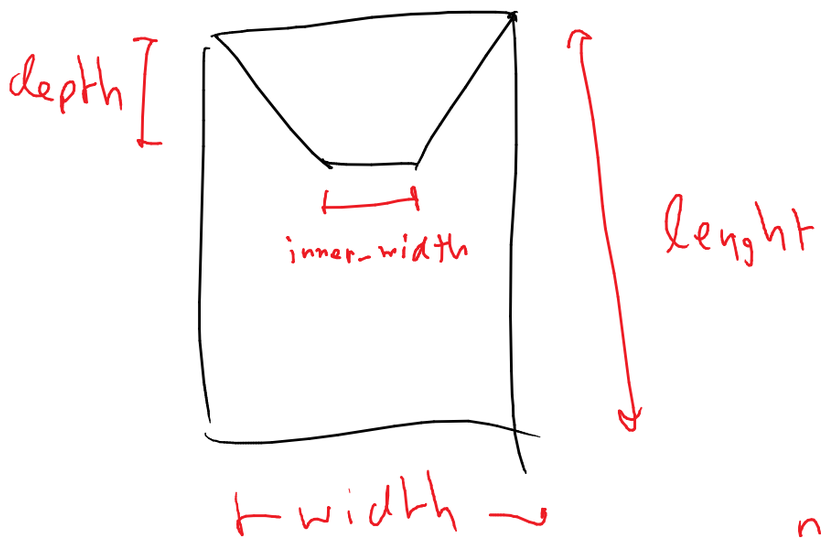


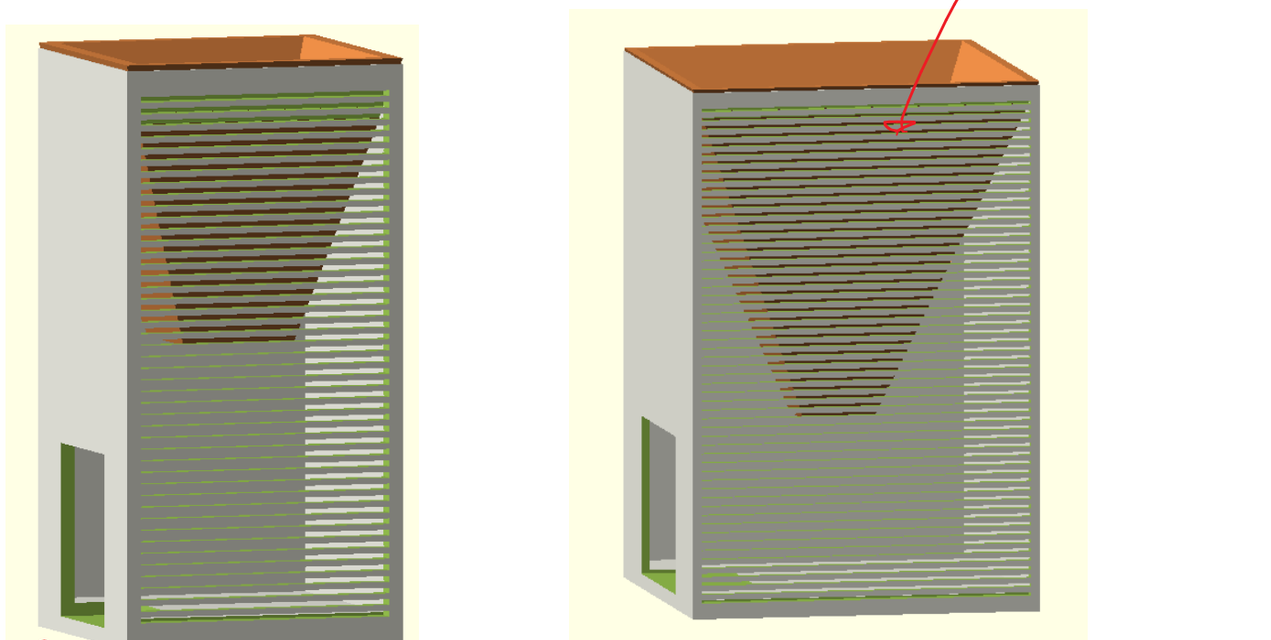
Model 2: lizard trap

Based on https://www.youtube.com/watch?v=7JrPTmyVNko

The only design change is from cylinder to rectangular shape.

`trap(length, width, inner_width, depth, n_bar);`





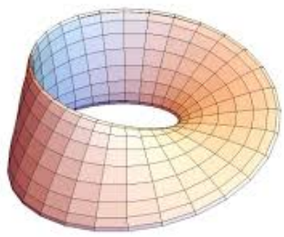
Model 3: parametric equation in OPENSCAD

Mobius stair

Mobius strip equation from wikipedia

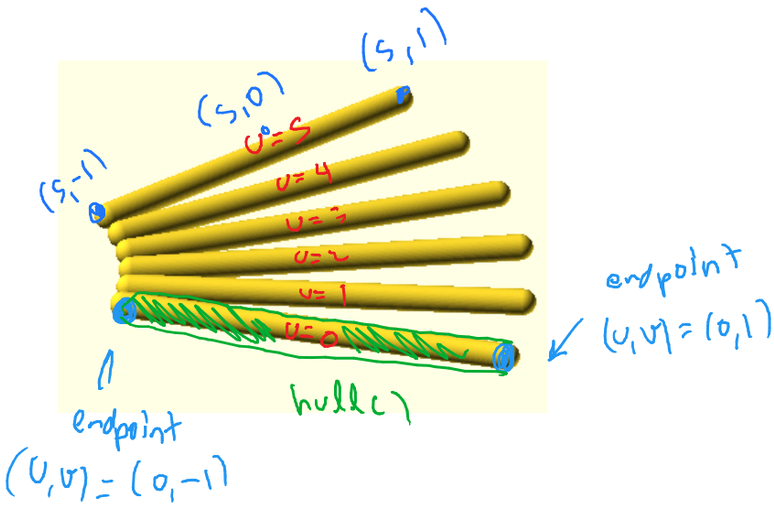
$$x(u,v) = \left(1 + \frac{v}{2}\cos\frac{u}{2}\right)\cos u$$
$$y(u,v) = \left(1 + \frac{v}{2}\cos\frac{u}{2}\right)\sin u$$
$$z(u,v) = \frac{v}{2}\sin\frac{u}{2}$$

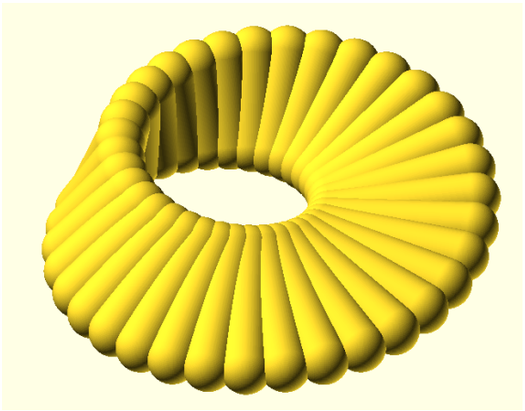
for $0 \le u < 2\pi$ and $-1 \le v \le 1$.



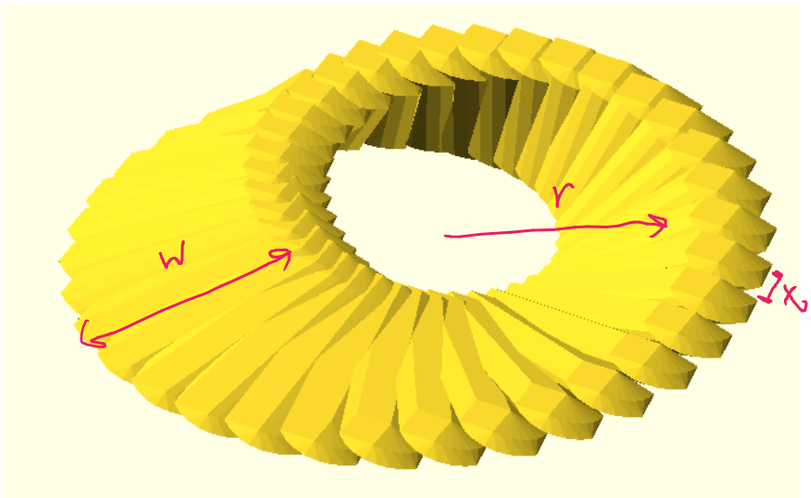
Got an idea from https://github.com/oherrala/openscad-moebius/blob/master/moebius-strip.scad

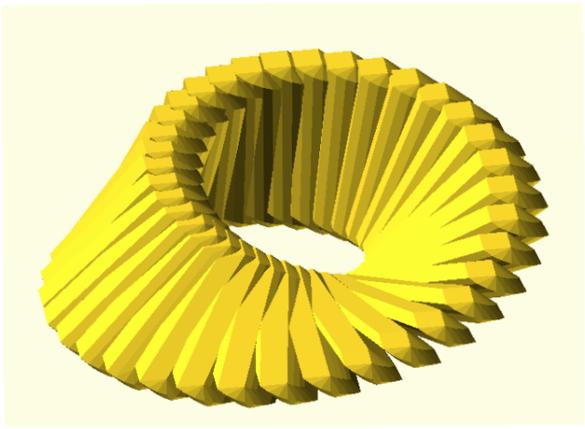
The code is clean and simple, however, I don't really understand the math behind it so i use a totally different approach. I divide the strip into parts from [u]=0 to [u]=360. Then for each [u], calculate the 2 end point of that section, then create a shape by connecting these 2 ends point using hull().



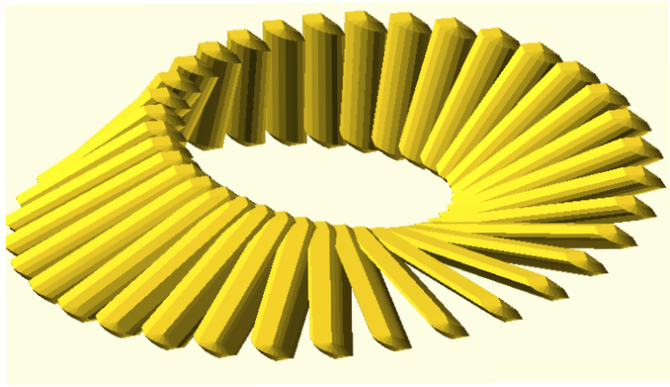


```
mobius(r=radius, w=width, t=thickness);
```

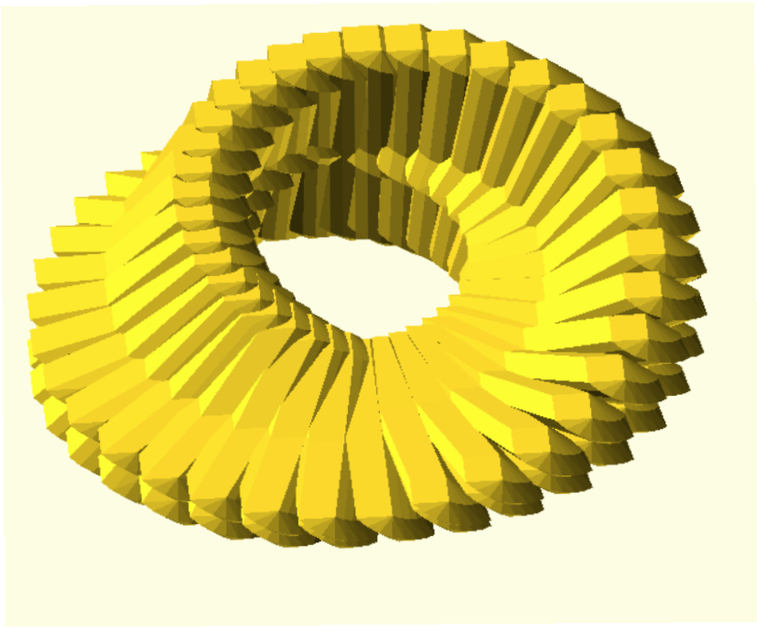




(r=30, w=30, t=5)



(r=60, w=30, t=5)



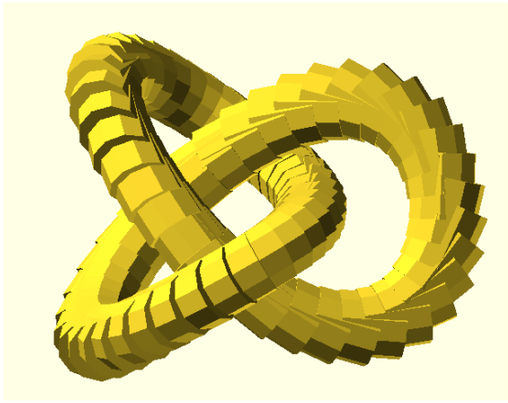
Forgot to record

Trefoil dragon ring

Trefoil knot equation from wikipedia

$$x = \sin t + 2\sin 2t$$
$$y = \cos t - 2\cos 2t$$
$$z = -\sin 3t$$

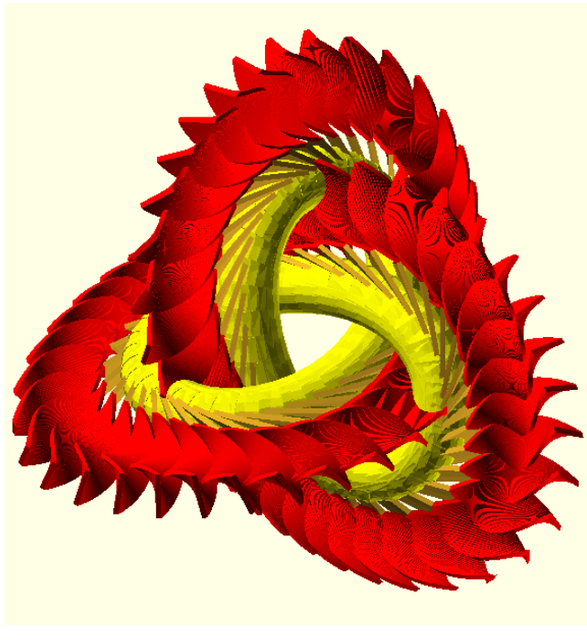
This one is more simple than mobius strip since there is only one parametric variable t. First, divided the trefoil knot into parts from [t]=0 to [t]=360, then for each part, create a dragon bodies and fur, we also have to rotate it so that it point correctly along the curves.



← base trefoil knot with no modification

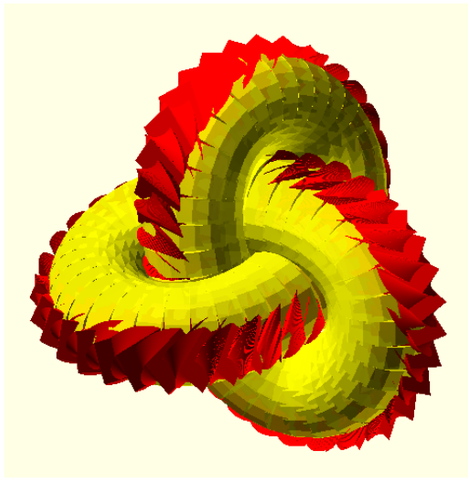
I didn't plan to make a dragon, but it look like dragon after playing around inserting random stuff into the based trefoil knot, so I don't really understand the actual meaning of a,b,c either. But the rule is that a+b should be less than c. c determine fur's size. a and b determine the body size.

`dragon(a=?,b=?,c=?);`

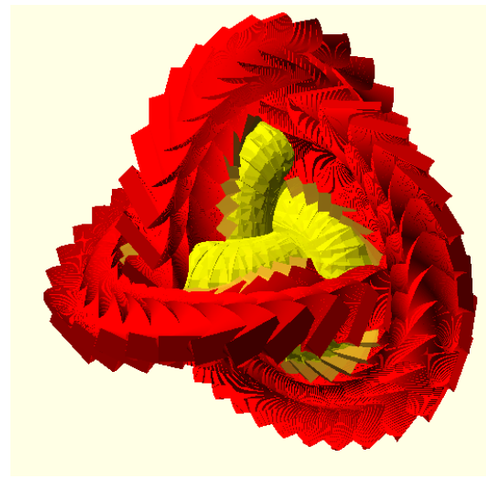


(a=1, b=0.1, c=2)

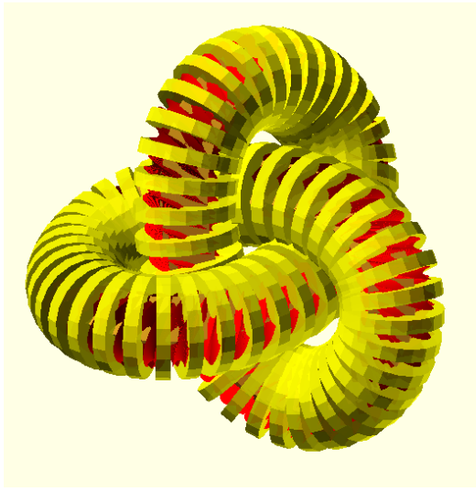
.



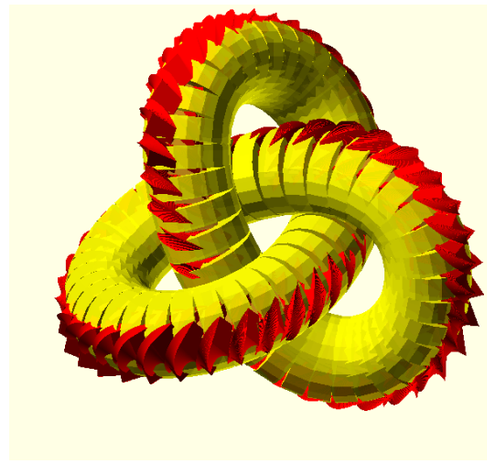
(a = 1, b = 1, c = 1)



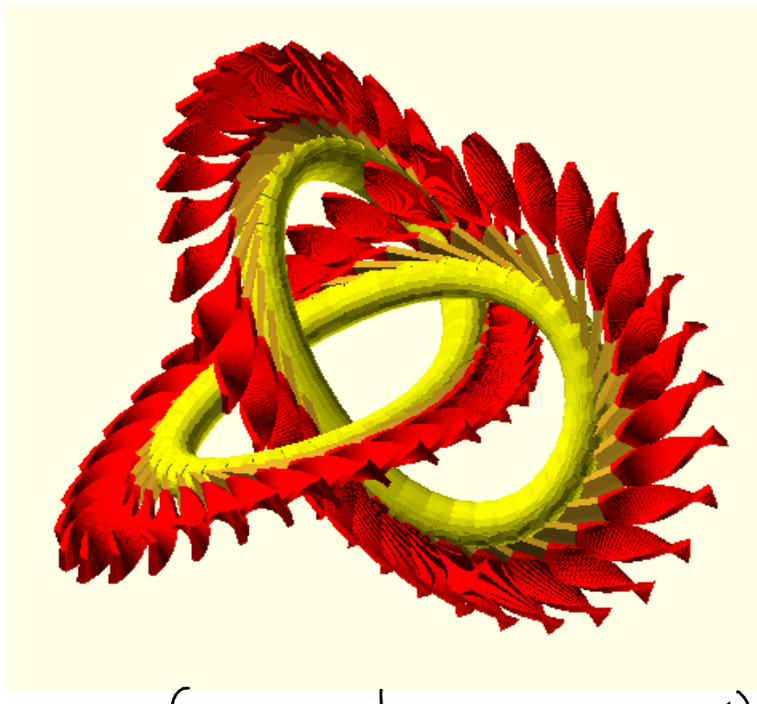
(a = 1, b = 2, c = 3)



(a = 1, b = 0.8, c = 0.5)



(a = 1, b = 0.5, c = 0.8)



(a = 0.5, b = 0.1, c = 1.5)