

3D Printed Static Animations

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Joint work with Bernat Espigulé



ST. LAWRENCE UNIVERSITY

Land Acknowledgement

Accompanying Files



<https://tinyurl.com/StaticAnimations>

What is a Static Animation?

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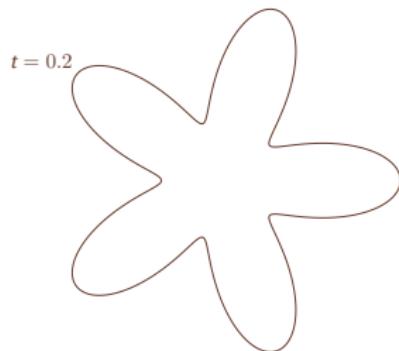
- An animation is a sequence of frames varying over time.
- Here is an animation of deforming polar flowers.
- In polar coordinates, the frames are given by the equations

$$r = 2 + t \cos(5\theta + 2\pi t)$$

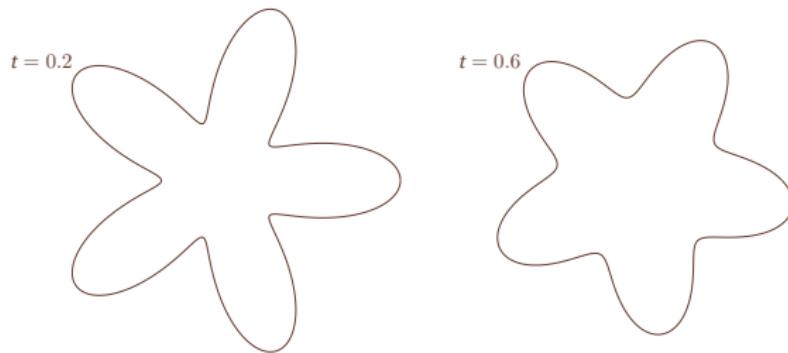
as t varies.

Let's extract a few of these frames...

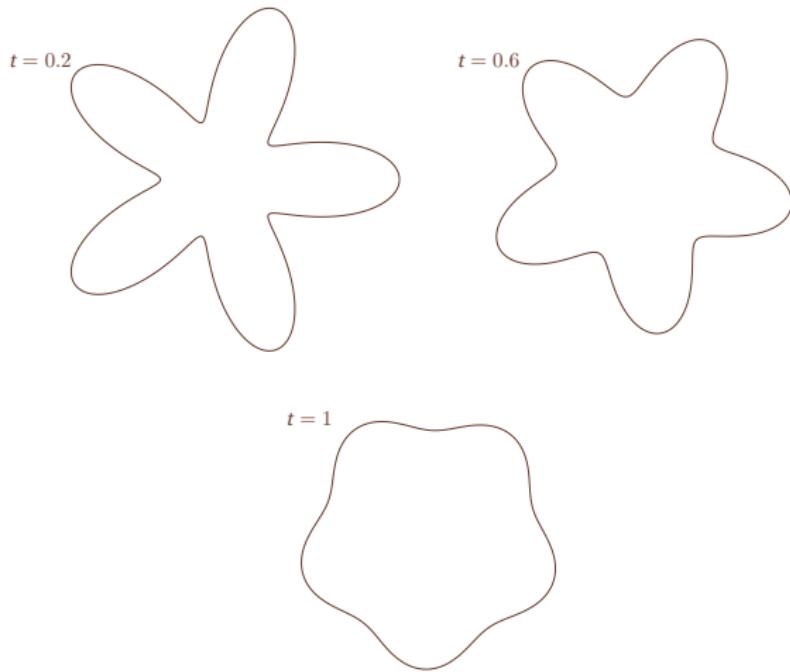
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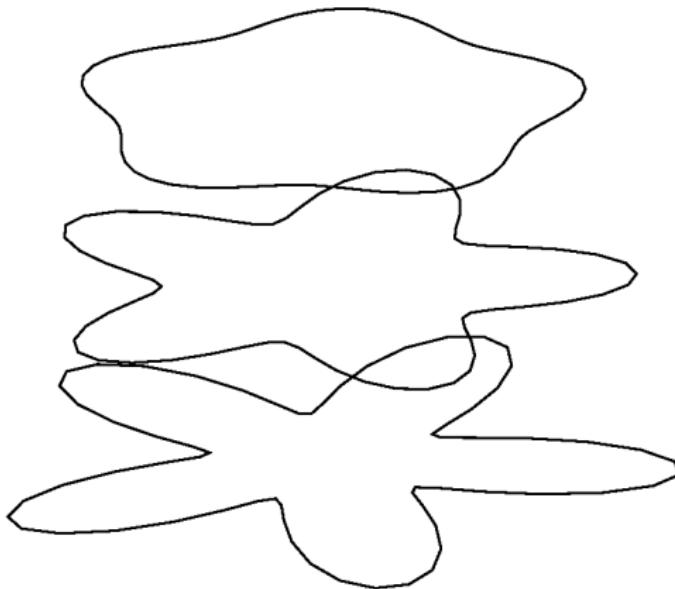
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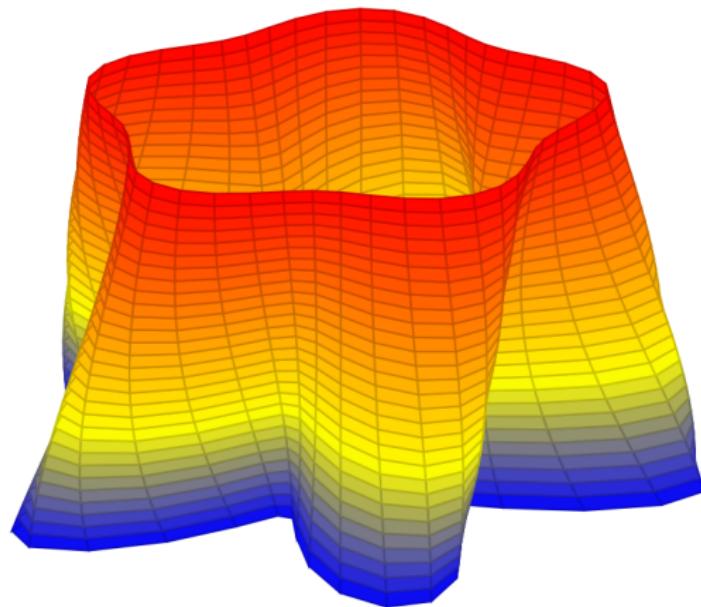
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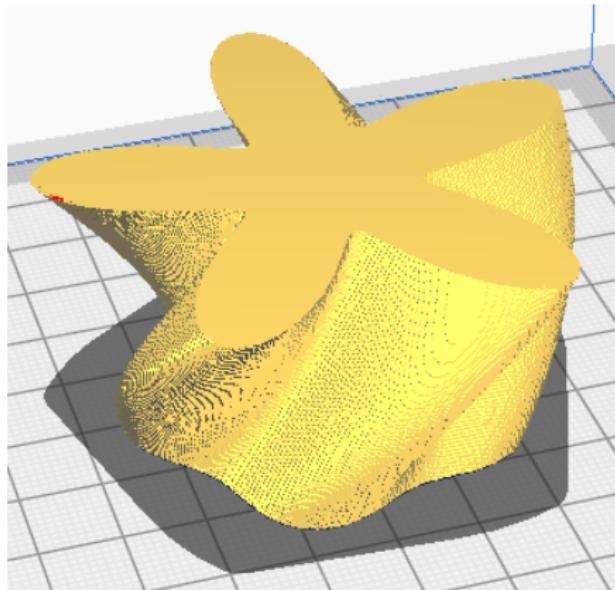
...align them vertically...



...fill in the rest...



...cap the top and bottom...



...and print it!



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The main idea is to feed a stack of 2D images to an open source medical and molecular visualization software called UCSF Chimera which will stitch them together into a 3D model.



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- Resize STL as desired (for example, in Cura).
- Slice and print!

Time to follow along!

- Install Chimera.
- Download the shared frames:

`flowers_1000.png`

`flowers_1001.png`

`:` `:` `:`

`flowers_1160.png`

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- It will load the list on the right in the wrong order.
- To fix this, you can start counting at 100 with 2 digits worth of frames, 1000 with 3 digits worth of slides, etc.

A few details: On Color Schemes

The frames we used drew our polar stars as white on black.

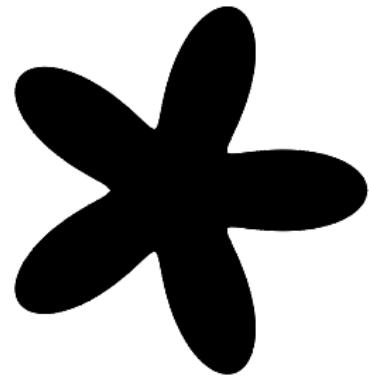
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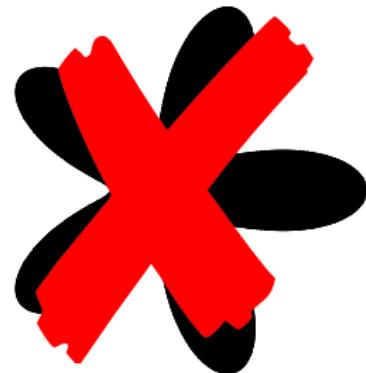
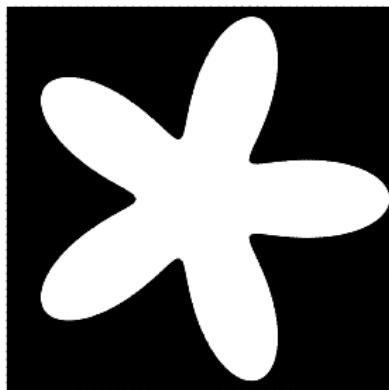
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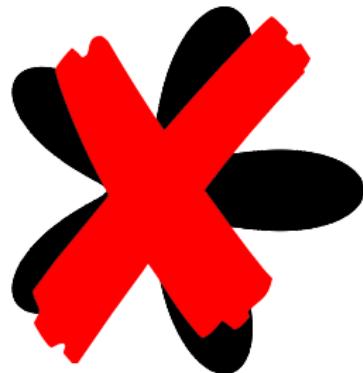
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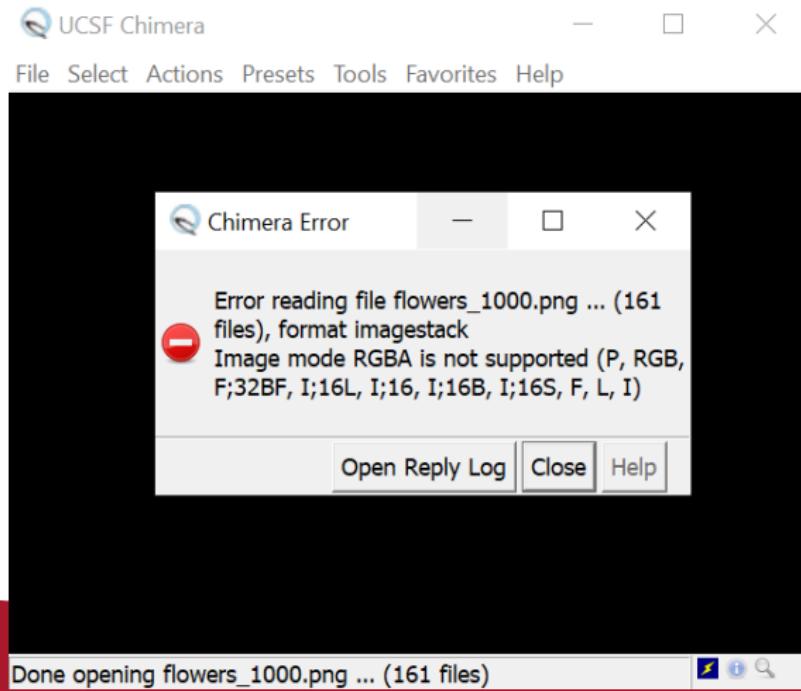
- Chimera reads white as solid, and black as empty space.
- (Think X-rays!)

A few details: Alpha Layers

When importing to Chimera you may get the following error message.

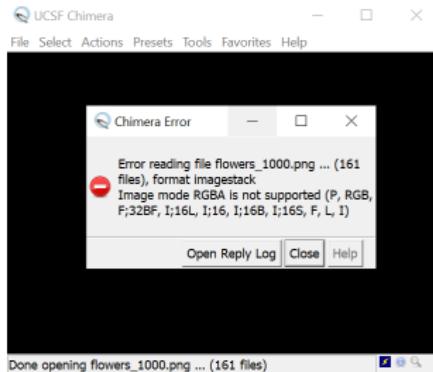
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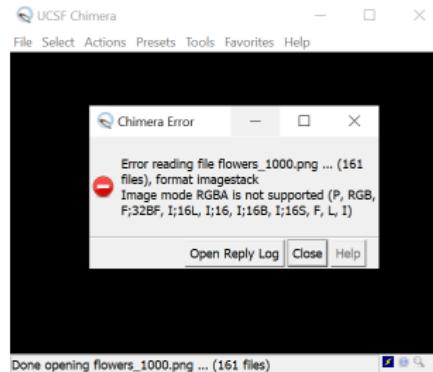
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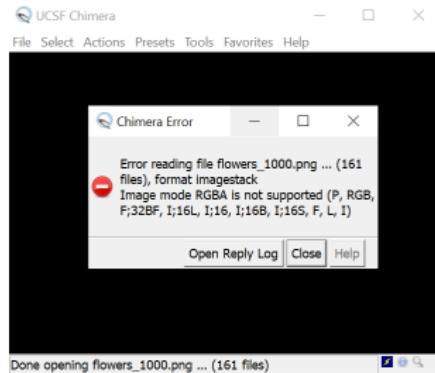
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- You must remove this layer. For example, using `alpha_remover.py` in the repository.

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- If you want more resolution, you can make it too large and scale down in post production.
- Note: this can lead to very large files.

There are files on the repo!

Feel free to download and edit code on the repo. For example, frames and code for animations of Julia sets. Here again is the link.

<https://tinyurl.com/StaticAnimations>

Thank you!

