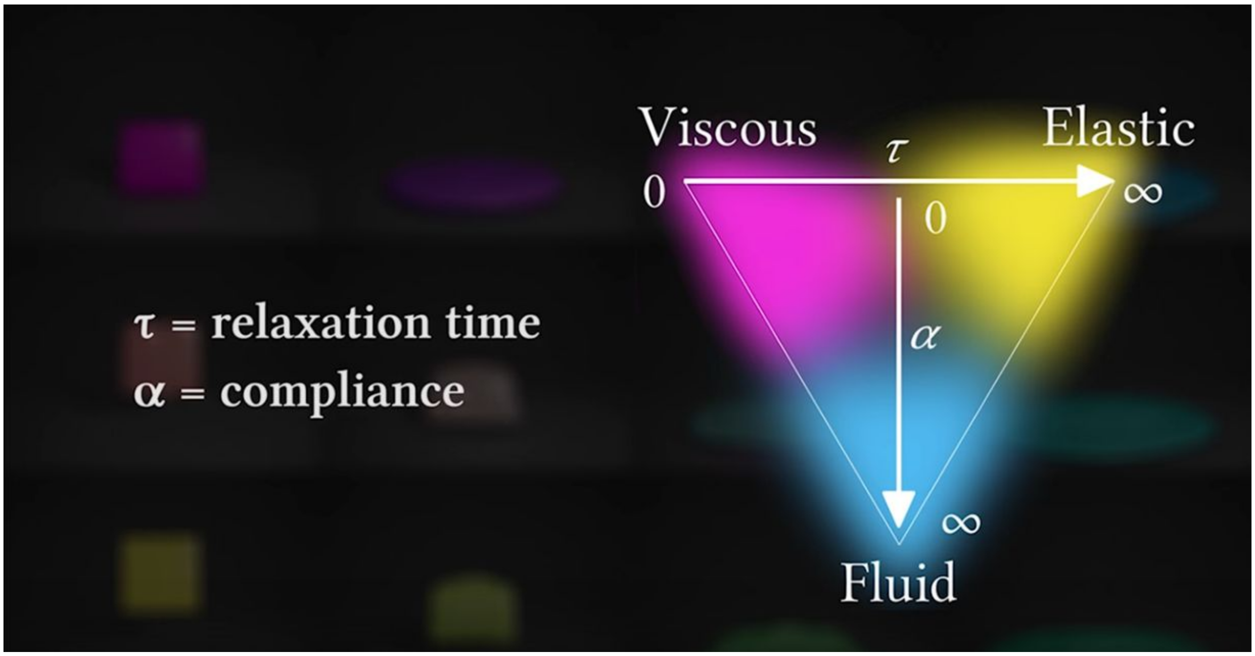
Homework 3 - Part C

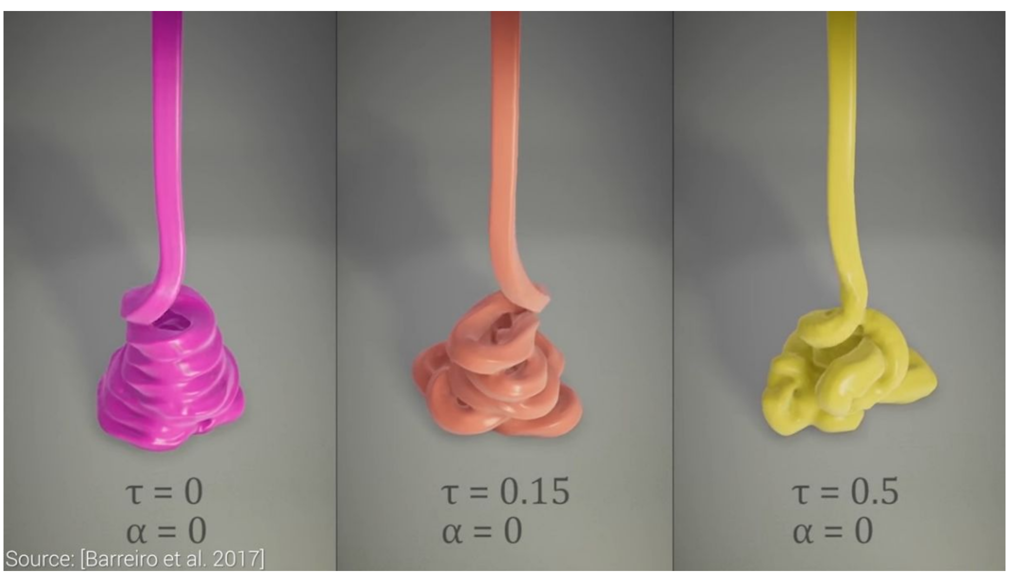
A)

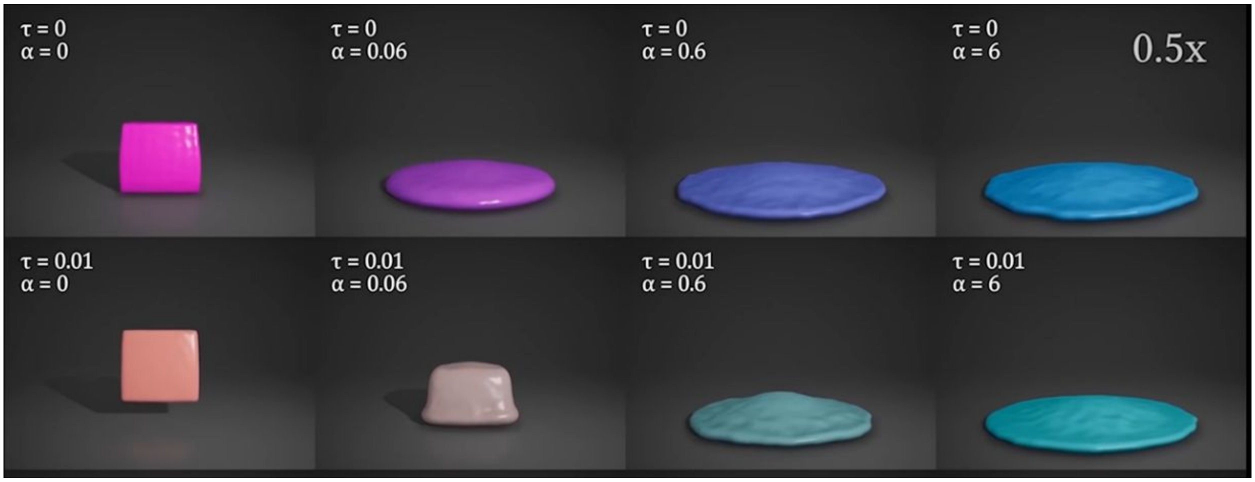
For my final project research, I chose to study viscoelastic fluid simulations. In the past, simulating these viscous liquids was frequently challenged by computation difficulties and errors that would add up and detract from the intention of the effect.

Viscosity is the resistance of a fluid against deformation. Elasticity is another property that people use to simulate fluids accurately. Both of these attributes can be anywhere along a spectrum. Different viscosity and elasticity values combine to produce a variety of liquids.



The tau symbol in the image above determines how viscous and elastic the fluid will be. This is referred to as relaxation time. The variety in the results can be seen below:





The alpha parameter, referred to in the paper as compliance. High alpha leads to more fluid behavior, and low alpha makes it behave more like a solid.

It's quite impressive how realistic these simulations can look, however, one of the concerns about this technique is that the fluid's properties are almost entirely dependent on tau and alpha (the relaxation time and compliance). More advanced viscous fluid simulations may need to improve the details and make the simulations more accurate/intelligent.

The research paper goes into more details about the math behind viscous liquid simulations. They mention that this method has some limitations, one of which being that it can only do relatively small simulations. Large scale ones require an immense amount of processing power. Perhaps some improvements to how they break down each simulation could improve performance. Some other fluid simulation researchers have found success splitting a single liquid simulation into several smaller parts.

Source: http://www.gmrv.es/Publications/2017/BGAO17/

B)

I forgot to partner up with some other students so I'm going to offer to help anyone who is willing to add another teammate, or create a team with the remaining, team-less people.