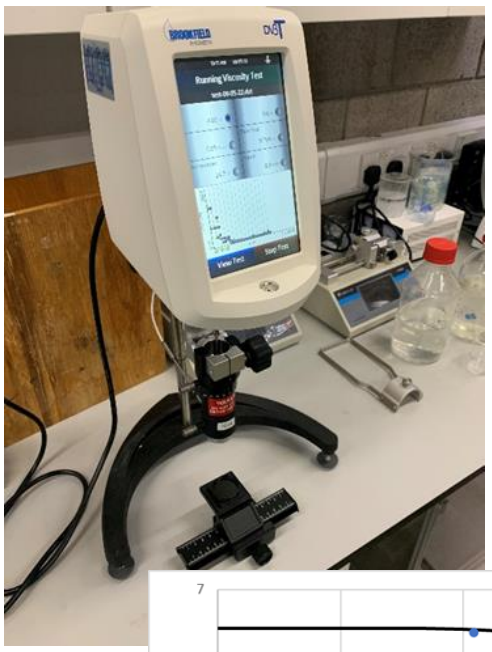
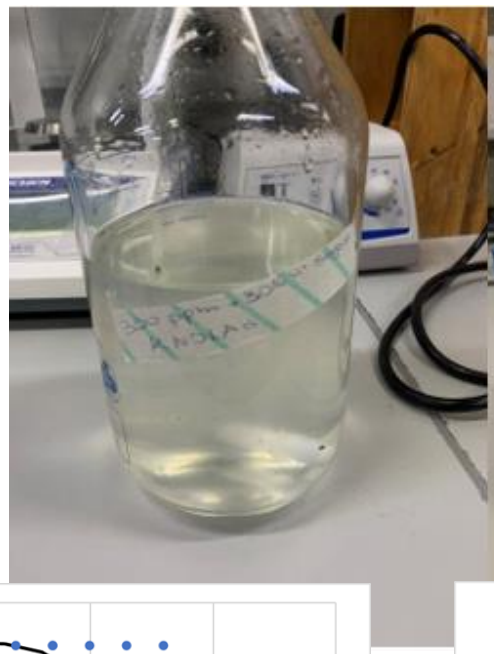
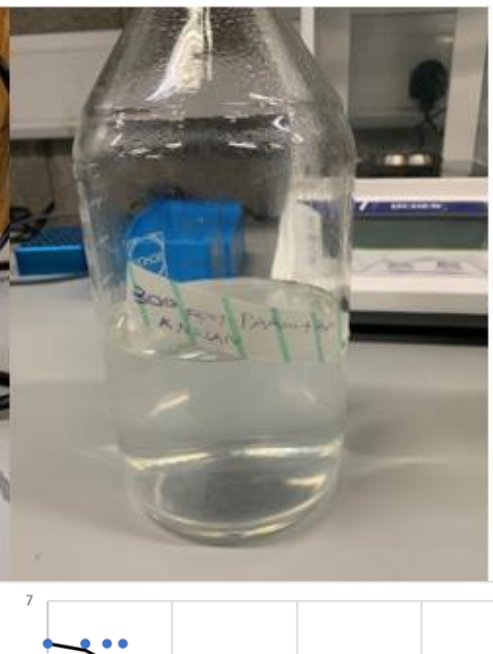
Viscoelasticity Characterization

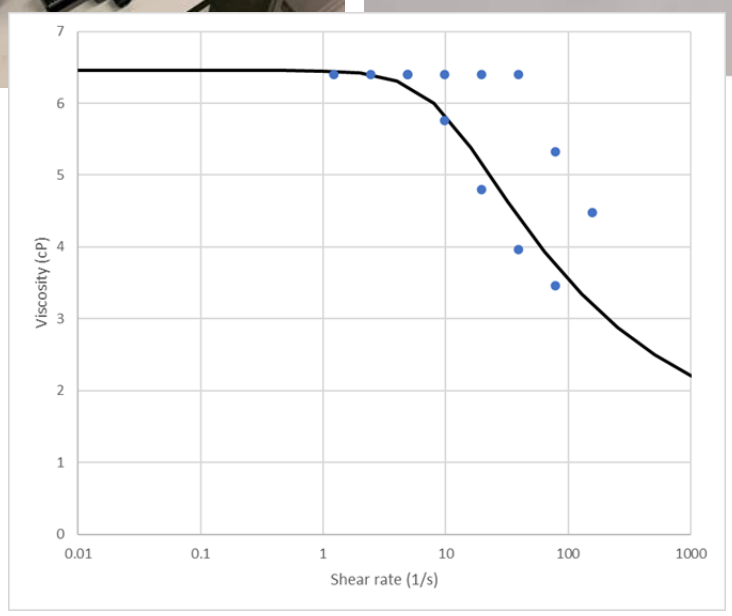
Brendan Kornatz

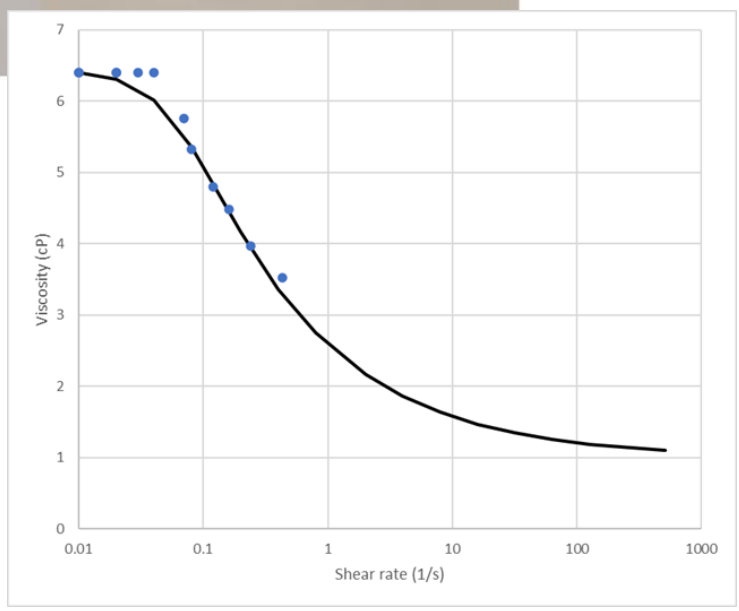






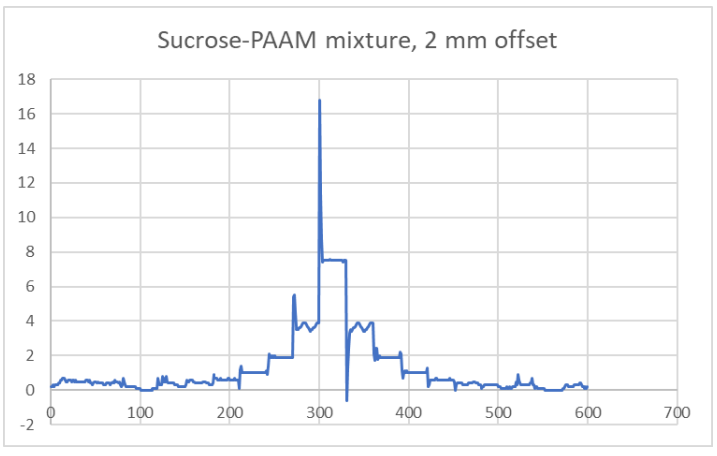
The following covers an experiment done to characterize the torque, shear-rate, and other attributes of two non-Newtonian fluid mixtures, in order to help computers model non-Newtonian fluids. First, two fluid mixtures were made, one a mixture of 70% polyacrylamide and 30% sucrose, another 70% polyacrylamide and 30% water.

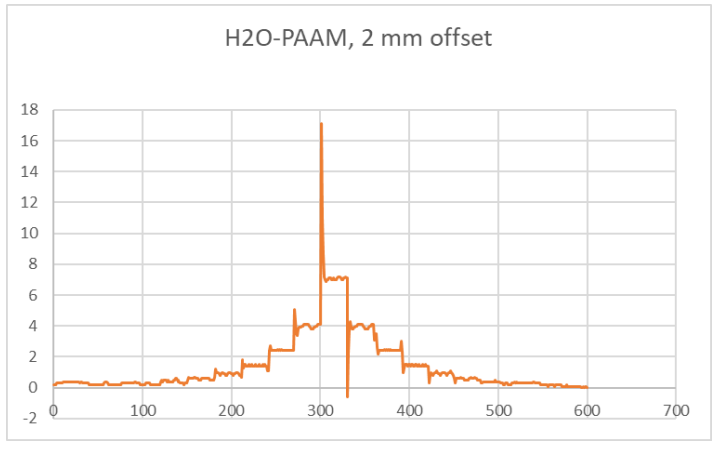


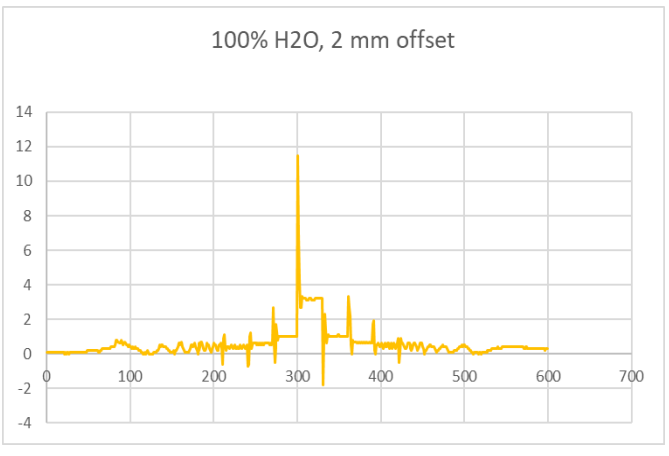


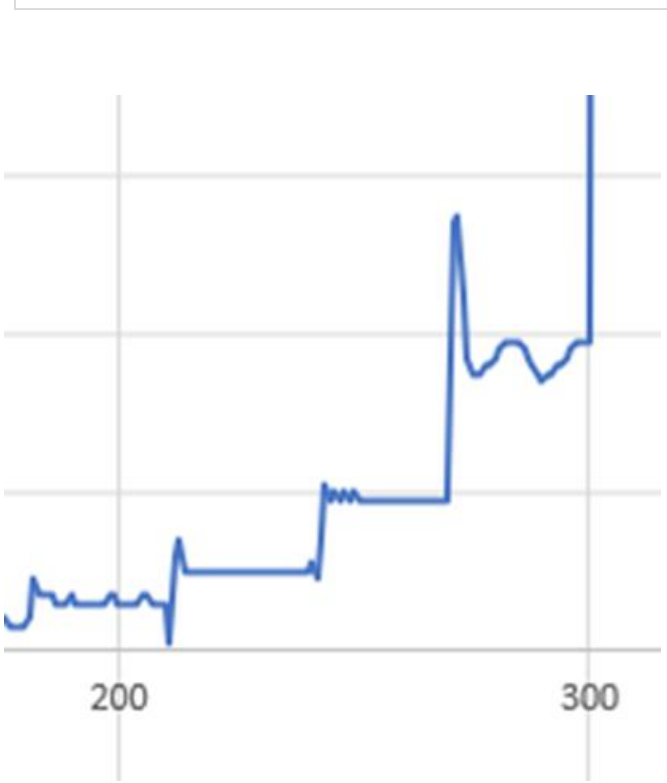
The first set of results analyzed was the control data set. This was data extracted from the two mixtures, without an offset applied. If the experiment is valid, the models need to follow a Carruea model, as this liquid has already been verified by previous research experiments.

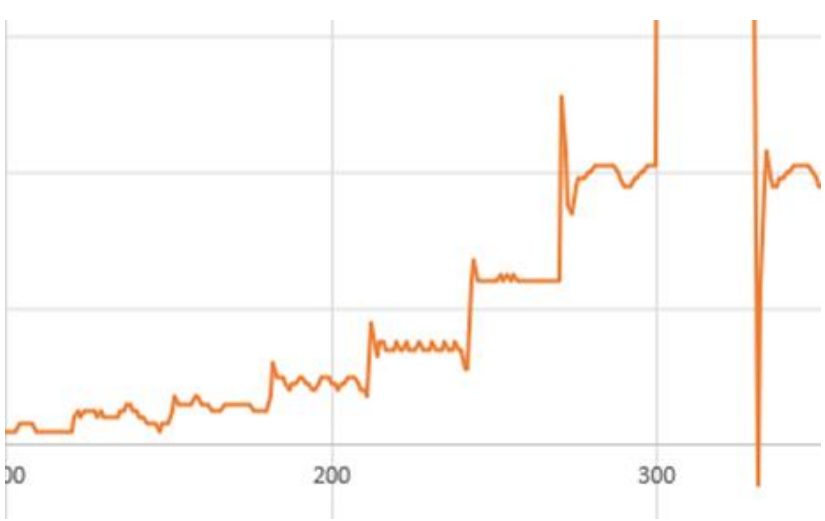
Torque Analysis:

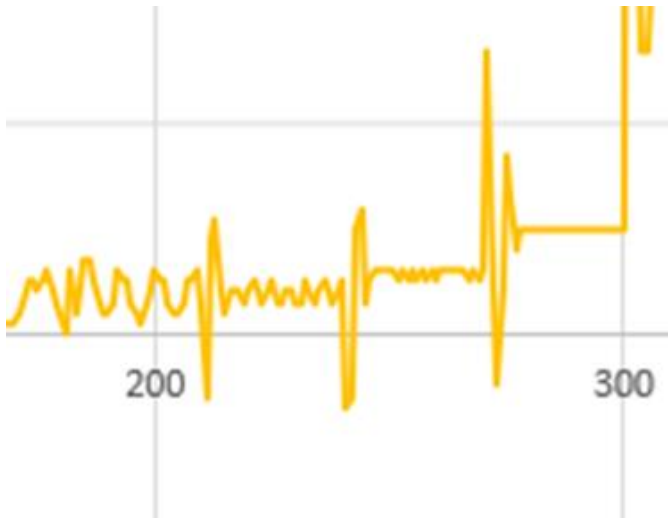












As shown in the previous graphs, the higher the viscosity, the less the data recorded oscillations in the torque. This checks out, as the more viscous fluid should have a higher resistance to the induced shear forces from the 2-millimeter offset in the altered apparatus. The higher resistance means the spindle is steadier, which results in the smaller oscillations seen. This is also exactly what one would expect from a Newtonian fluid with a high viscosity, which means that the non-Newtonian properties of the mixtures did not cause any unique behavior. While nothing ground-breaking, it still provides valid characteristics for the modeling of these fluids.