

7. ENERGY CALCULATIONS

- I took the fit I got and then integrated it from θ_{\min} to θ_{\max} (0.331 rad to 1.657 rad)
 - This gave the value of stored energy, which was $U = 0.407 \text{ J}$
- To get the maximum gravitational potential energy of my hopper I recorded the hop height from the hopper celebration video, and measured the mass of my hopper
 - Since $U_{\text{grav}} = mgh$, and I had $m = 0.03 \text{ kg}$ and $h = 0.51 \text{ m}$, $U_{\text{grav}} = 0.150 \text{ J}$
- So the ratio of $U_{\text{grav}} / U = 0.368$, or 36.8%
 - This is only the efficiency of the conversion of stored potential energy to gravitational potential energy
 - At the max hop height, the hopper has translational and rotational kinetic energy as well
 - So that percentage is not a measurement of the overall efficiency of the hopper
 - If we had values of the velocity and angular velocity at the max hop height, then we could calculate the true efficiency of the hopper