

Layne Barrett

Junior Division Physics

Twist But Don't Shout

The purpose of this project was to determine if the precessional torque in a flywheel-powered vehicle can be eliminated by counter-rotating two flywheels. I hypothesized that if two counter-rotating flywheels are put on a common axis, then the precessional torque in a vehicle will be eliminated. Before testing my hypothesis, I built a flywheel system with two flywheels on a common axis supported by a gimbal system. The two flywheels are driven in opposite directions with a friction gear system driven by a cordless drill. I ran two tests which both had a single flywheel as the control group and counter-rotating flywheels as the test group. The first test measured the angular displacement of the inner gimbal using a fixed flywheel angular velocity and various displacements of the outer gimbal. The second test performed the same measurements with a fixed displacement of the outer gimbal and various angular velocities. The resulting data gave partial support to my hypothesis. The dependent variable (precession) for the control group showed large results for every value of the independent variables (angular displacement and velocity), averaging 231.1 degrees of precession. The test group showed much smaller results, averaging 2.8 degrees of precession (98.8% decrease). The mode of the test group results was a solid 0 degrees of precession. However small the results, the test group still had some amount of precession, leading me to conclude that counter-rotating two flywheels significantly reduces, but does not eliminate, precessional torques.