Centripetal Force on a Model Plane

**Purpose:** To determine the tension acting as a centripetal force on a model airplane suspended from the ceiling.

**Procedure:** Turn on the airplane and start it in a circular path. Once the flight path is consistent, use a camera to record several revolutions. Use the video to determine the flight radius and period. From the data, calculate the tension in the string with both methods and calculate a percentage of difference.

**Data:**

Mplane= 0.132 kg

Lstring = 1.0 m

R =0.72 m

T(period)= 1.6 s

**Calculations:**

**Method 1**

Sinθ = R/L ∑Fy= ma = 0 Tx= (mg/cosθ)sinθ

θ = sin-1(0.72m/1.00m) = 46.05\* Ty= mg Tx= Fc = 1.343 N

**Method 2**

Fc = m(4π2R/T2)

Fc = (0.132kg)(4π2(0.72m)/1.6s)

Fc = 1.466 N

**Percent Difference**

% = Fc1-Fc2/(Fc1+Fc2/2) \*100 = 2.19%

**Conclusion:**

We managed to have a very small percent difference, which suggests some level of accuracy. However, any error may have been due to environmental factors and the fact that we had to eyeball our measurements from a video.