MIE301 – Lab 2: Calculating Mechanism Properties

REPORT

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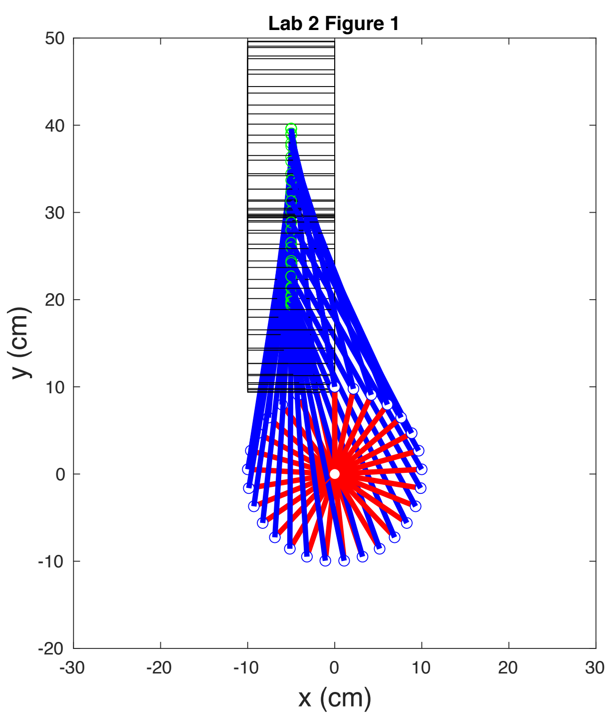
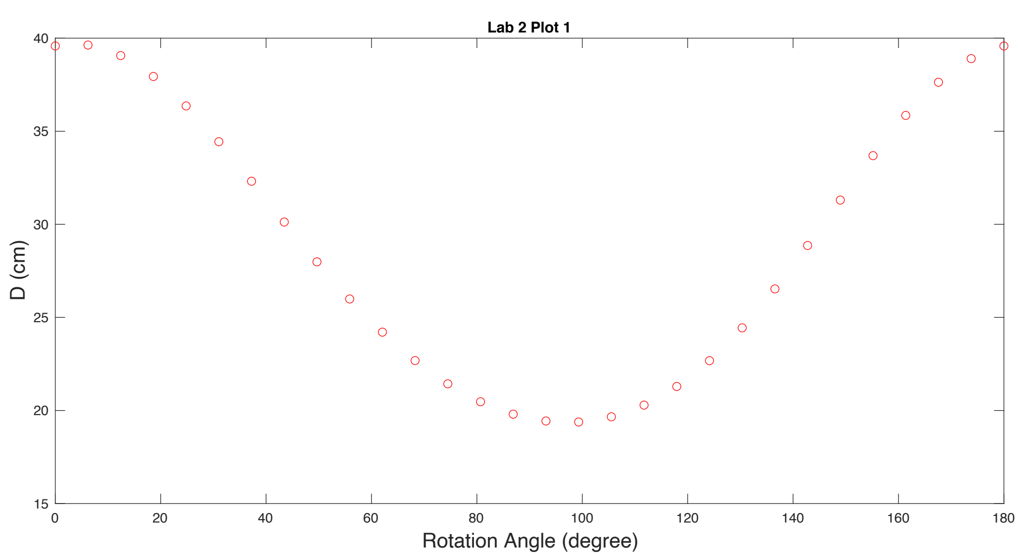
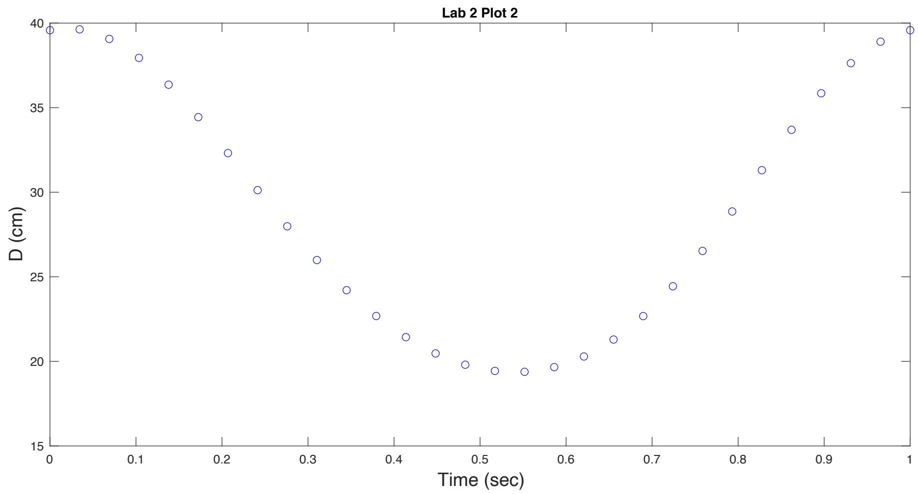
(a)



(b)



(c)



(d)
Max theta2 = 6.21˚
Min theta2 = 99.31˚

(e)
Max D - Min D = 39.63-19.38 = 20.25 cm

(f)
Time to reach min D from max D: 0.5517 - 0.0345 = 0.5172
Time to reach max D from min D: (1-0.5517) + 0.0345 = 0.4828
TR = 0.5172/0.4828 = 1.07

(g)
maxVelD = 2.4403 cm/s

(h)
Smaller theta2 gives a better approximation of the motion of point D. The optimal step size would be as small as possible.

(i)
The range of motion of point D would decrease if the offset A was increased and vice versa. This would affect the calculations for theta2 at the limit positions, the max velocity, and the stroke length, but it would not affect the calculation of the timing ratio.

(j)
In a real IC engine, the acceleration of rotation is not constant because the engine needs to start up first before doing work. This means that the speed of rotation must increase first over time, hence acceleration.