Machine Dynamics – Assignment 2

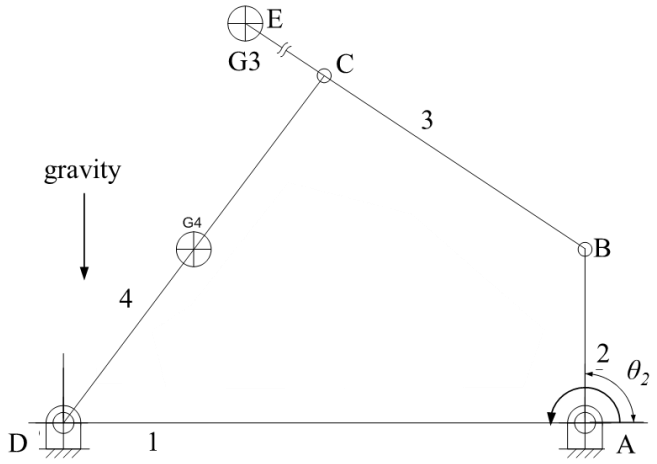
All the parameters and settings are the same as in Assignment 1. Use the program you developed in Assignment 1 to perform the following analysis and design. Submit a complete hardcopy report.

1. When θ_2 varies from 150 to 240 degree, a constant loading 20 Nm is applied on Link 4 in the direction opposite to its motion. Design a flywheel attached on Link 2. Consider only the kinetic energy change of Link 2 and set the coefficient of fluctuation k = 0.05. Find the moment of inertia I of the flywheel and analyze the change of the control input and reaction force on Link 2, and the changes of the shaking force and shaking moment.

2. Please use the linkage balance method from the textbook to adjust the parameters (but the length must be fixed) of the links. Find the change of location of the CG of the four-bar linkage and analyze the control input and reaction force on Link 2, and also the changes of the shaking force and shaking moment.

(Compare the results of the above two tasks with the original mechanism)

Known: a 4-bar mechanism as shown below. Link 2 - θ_2 is equal to 90 degree, Link 2 is the input control bar and rotating at 120rpm CCW. The driving (input) torque is unknown. The gravity is parallel to the motion plane and pointing down.



AB = 100 mm	G2 = point A
BC = 180 mm	G3 = point E
CD = 250 mm	G4 = middle of CD
AD = 300 mm AD is horizontal	
BE = 360 mm	
m2 = 1 kg	I2 = 0.02 kg·m^2
m3 = 2 kg	I3 = 0.06 kg·m^2
m4 = 0.2 kg	I4 = 0.005 kg·m^2