

ME41055

Multibody Dynamics B

Spring Term 2019

Homework Assignment 4 (HW4)

For this assignment you have to redo homework assignment HW1, and HW3, but now you will use independent generalized coordinates and Lagrange equations to derive the equations of motion. You can make your own choice for the independent generalized coordinates, either absolute or relative coordinates and/or angles. As you like it, but in your choice do address the problem of non-unique mapping from the generalized coordinates to the CoM coordinates. Also, when you want to compare your result here with that of HW1, and HW3, you will not be able to compare the constraint forces (or impulses) because by using independent generalized coordinates and Lagrange equations you have eliminated those from the calculation.

- a. Select your set of generalized coordinates for the double pendulum of HW1 and substantiate your choice.
- b. Derive the equations of motion in terms of your generalized coordinates for the double pendulum system of HW1 using Lagrange equations of motion.
- c. Redo assignments HW1b, HW1c, and HW1d, and compare your results.
- d. Redo assignments HW3a, and compare your results.
- e. Redo assignments HW3b, and compare your results.
- f. Redo assignments HW3c, and compare your results.
- g. Suppose you want to determine one of the constraint forces in the system while having used independent generalised coordinates and Lagrange equations. Describe (in words) a method to do that.