

MATLAB Assignment 7

Due Date: November 3, 2011

Turning in your homework: place all your files in a directory called “lastNameDate”; zip that directory and drop it in the mailbox at Learn@UW.

Problem 1 [not straightforward]. Consider the pendulum at page 60 of the textbook (Example 3.2.1), whose total length is 2. For that pendulum assume that its mass is 2.5 and its mass moment of inertia is 1. All units are S.I. Also assume that a motion is prescribed on the pendulum to the effect that its orientation should change like $\phi(t) = \pi/2 + 2\pi t$. The state of this model is to be characterized by an array of Cartesian generalized coordinates $\mathbf{q} = [x, y, \phi]^T$.

Use the pair of files `simplePend321.acf` and `simplePend321.adm` that you generated in Problem 3 of the previous assignment to carry out using `simEngine2D` a Kinematics analysis of this mechanism.

Upload the following information on the forum:

- (a) A plot of the acceleration $\ddot{x}(t)$ as a function of time
- (b) A figure that plots on the horizontal axis $x(t)$ and on the horizontal axis $y(t)$

NOTE: This problem will require you to go through parsing, computing Φ , $\Phi_{\mathbf{q}}$, ν , γ , implementation of Newton-Raphson method, solution of velocity problem, and solution of acceleration problem. It will basically take you through all major concepts that we discussed in ME451 so far.