

## ME751: Assignment 9

**Problem 1** [**simEngine3D track**]. Consider the exact same Problem 1 of last time. Run a dynamics analysis like you did last time but use a modified-Newton and then a Newton-Raphson approach to handle the system of equations you are getting when solving the index-3 DAE problem at hand.

What you will have to do is:

- a) Upload on the forum a set of two plots that show the difference in the acceleration for the pendulum for the quasi-Newton, modified-Newton, and Newton-Raphson solutions. Take as reference solution the Newton-Raphson solution. You should have two sets of plots: the first one, compares quasi-Newton against Newton-Raphson for  $x$ ,  $y$ , and  $z$  components of the translational acceleration. The second one compares modified-Newton against Newton-Raphson for  $x$ ,  $y$ , and  $z$  components of the translational acceleration.
- b) Upload on the forum a plot of the number of iterations required to converge at each time step. You should have three lines in this plot
- c) Indicate on the forum the amount of time required to finish the simulation. Indicate what step-size  $h$  (or  $\Delta t$ ) you used.

**Upload your results in a zip file at Learn@UW.**

**Post any questions on the ME751 Forum.**

**Problem 2** [**simEngine3D track**]. This problem is identical to Problem 1 above, but calls for you to use the mechanism in Problem 2 of the last assignment (the double pendulum). For this problem focus on Body 2 (second pendulum) when you plot the differences in accelerations.

**Upload your results in a zip file at Learn@UW.**

**Post any questions on the ME751 Forum.**

**Problem 3** [**Chrono track**]. Go to <http://lim.ii.udc.es/mbsbenchmark/docs/specifications.html>. Pick up the Bricard mechanism and carry out the analysis whose results are reported under the “View results” link. For this problem ([http://lim.ii.udc.es/mbsbenchmark/dist/A04/A04\\_specification.xml](http://lim.ii.udc.es/mbsbenchmark/dist/A04/A04_specification.xml)):

- Generate a movie of the motion of the mechanism
- Generate a plot of the displacement of point P3

**Upload your results in a zip file at Learn@UW.**

**Post any questions on the Chrono Forum.**