

Homework #8 (ASEN5010, Spring 2006)

(Due at Start of Class on Tuesday, 11 April 2006)

Solve Text Problems 6.12 and 7.1

Hint for Problem 7.1(a):

Step 1: Use Equations (6.48) and (7.7).

Step 2: In doing so, express $\mathbf{J}\dot{\boldsymbol{\omega}} + [\tilde{\boldsymbol{\omega}}][\mathbf{J}]\boldsymbol{\omega} = \mathbf{M}$ and equation(7.7) into the following form

$$\begin{aligned}\dot{\boldsymbol{\omega}} &= \mathbf{J}^{-1}(\mathbf{M} - [\tilde{\boldsymbol{\omega}}][\mathbf{J}]\boldsymbol{\omega}) \Rightarrow \dot{\mathbf{y}}_1 = \mathbf{f}(\mathbf{y}_1, \mathbf{M}) \\ \dot{\boldsymbol{\theta}} &= f(\boldsymbol{\omega}, \boldsymbol{\theta}) \Rightarrow \dot{\mathbf{y}}_2 = \mathbf{f}(\mathbf{y}_1, \mathbf{y}_2)\end{aligned}\tag{1}$$

Step 3: Use "ode45" of Matlab to integrate the coupled equations of motion.

Make sure you read "doc ode45" before you launch on solving the problem

If you are not sure what you are doing, please ask someone, including me!

Hint for Problem 7.1(b):

For the analytical solution, use $J = (4223 + 4133)/2$, and you may use the function "quad" in Matlab to integrate (7.16) and (7.17). For example,

Examples

Pass M-file function handle @myfun to quad:

```
C2 = quad(@myfun,theta-initial,theta-final);
```

where the M-file myfun.m is

```
function y = myfun(theta)
```

```
y = cos(theta)/sqrt(theta);
```