AircraftPitch_SystemAnalysis

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```
In [1]: import sympy
        from IPython.display import Latex, display
        from sympy import Poly
        from sympy.abc import s, z

        from control.matlab import *
```

```
In [2]: %pylab %matplotlib inline
```

```
UsageError: unrecognized arguments: inline
```

1 Aircraft Pitch: System Analysis

From the main problem, the dynamic equations in the Laplace domain and the open-loop transfer function of the aircraft pitch dynamics are:

$$sA(s) = -0.313A(s) + 56.7Q(s) + 0.232\Delta(s)$$

$$sQ(s) = -0.0139A(s) - 0.426Q(s) + 0.0203\Delta(s)$$

$$s\Theta(s) = 56.7Q(s)$$

$$P(s) = \frac{\Theta(s)}{\Delta(s)} = \frac{1.151s + 0.1774}{s^3 + 0.739s^2 + 0.921s}$$

For the original problem setup and the derivation of the above equations please refer to the Aircraft Pitch: System Modeling page For a step reference, the design criteria are the following. * Overshoot less than 10 * Rise time less than 2 seconds * Settling time less than 10 seconds * Steady-state error less than 2

1.1 Open-loop response

First create a new m-file and type in the following commands (refer to the main problem for the details of getting these commands).