University of California, Davis
Dept. of Mechanical and Aerospace Engineering

MAE – 275

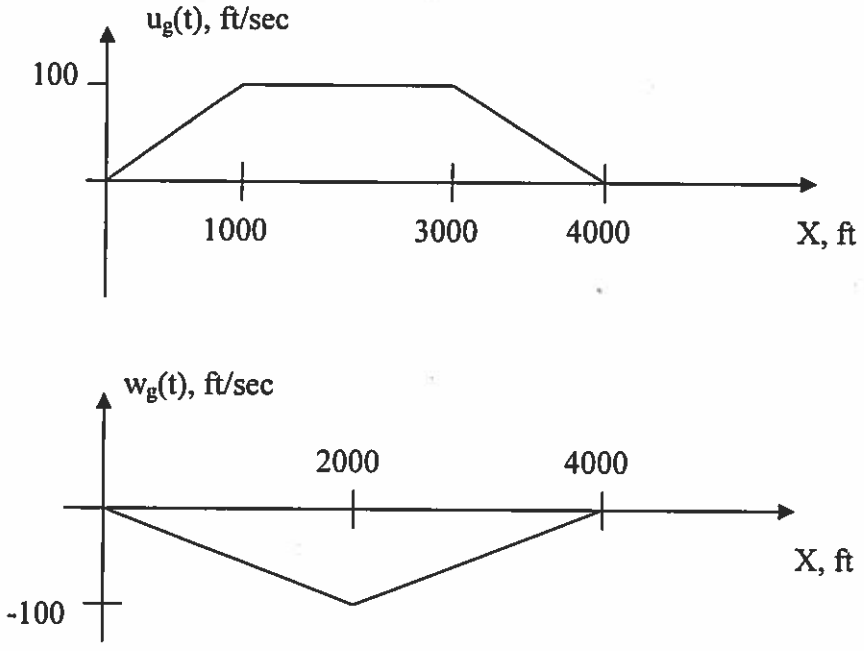
Homework Assignment 4

Due: Thursday, May 7

Using the aerodynamic data for longitudinal motion for the A4-D aircraft in Flight Condition 5 in McRuer, Ashkenas and Graham, determine the response of the aircraft to the turbulence field described below using Simulink. Assume only elevator control is used. The response variables of interest are (1) pitch attitude $\theta(t)$, (2) angle of attack $\alpha(t)$ (3) altitude deviation from trim h(t), (3) airspeed deviation from trim u(t), normal acceleration at the cg $a_z(t)$, and finally elevator angle $\delta_e(t)$. For an expression for $a_z(t)$, see p. 5-3 in McRuer, Ashkenas and Graham. For h(t), integrate $-\dot{Z}(t)$ where $\dot{Z}(t)$ is one of the "navigation" equations. In your model assume that a stabilization system is in operation in which the elevator is being driven by a signal proportional to pitch attitude as

$$\delta_e(t) = 0.5\theta(t)$$

Turbulence Field:



Plot your responses $0 \le t \le 15$ sec. Assume $t = 0$ when $X = 0$ above, where X is the distance along the linear flight path. Include your Simulink diagram in your solution.