Problem Sheet Six

Due March 28, 2002

Read Chapter 3, all of it.

An aircraft (business jet - Jetstar) has the following aerodynamic properties: all units where appropriate are per radian.

Mach 0.2 @ sea level

M_a	C_L	C_D	C_{L_α}	C_{D_α}	C_{m_α}	C_{L_q}	C_{m_q}	$C_{L_{\delta_e}}$	$C_{m_{\delta_e}}$
0.2	1.1819	0.095	5.0	0.75	-0.8	0.0	-8.0	0.4	-0.81
	C_{n_β}	$C_{n_{\delta_r}}$							
	0.137	-0.063							

Its physical characteristics are given by:

W = 38,200 lbs h = 0.25 S = 545.5 ft^2 $\bar{c}$ = 10.93 ft b = 53.75 ft

21. The Jetstar has two engines located 11 ft off the center line. If the aircraft is climbing out at Mach = 0.2 at a flight path angle of 10 deg. and the aircraft loses its right engine (assume T goes to zero). Determine the rudder angle required to hold the aircraft at zero sideslip angle. State any assumptions that you may make. (Note: use only the yaw moment equation to determine the rudder angle*).

22. If the maximum rudder angle is 30 degrees in either direction, find the minimum controllable airspeed for a single engine out assuming that the maximum thrust was produced for the climb condition in problem 21. (Note: use only the yaw moment equation to determine V_{mc}*)

23. If the aircraft lands at 120 ft/sec, find the maximum cross wind component allowable. (Again, just consider the yaw moment equation*)

*Later on we will use three equations to determine these same quantities accounting for not only yaw balance, but side-orce and roll moment balance. The dominant effects are determined from the yaw moment equation

24,25. Estimate the weathercock stability parameter for the F104 Starfighter that you did the longitudinal estimates for in problem set four, for the case of low speed flight, M_a = 0.2.