AOE 3134 Homework #7

Assigned: April 12, 2007

Due: April 19, 2007 (Place your homework in the box outside my office by 5 PM.)

Problem 1. Referring to the phugoid mode approximation developed in Lecture 15, suppose we relax the assumption that Z_q and $Z_{\dot{w}}$ are negligible. Derive new approximate formulas for the phugoid natural frequency and damping ratio.

Problem 2. For the Navion general aviation airplane considered in Homework #6, compute the approximate phugoid natural frequency and damping ratio, using your results from Problem 1, and the approximate short period natural frequency and damping ratio using the approximations given in Lecture 19. Also compute the time and number of cycles to half amplitude. Compare with the exact values.

	ω_n (rad/s)	ζ	t_{half} (s)	N_{half} (cycles)
Phugoid, Approximate				
Phugoid, Actual				
Short period, Approximate				
Short period, Actual				

Discussion:

Problem 3. For the Navion general aviation airplane considered in Homework #6, compute the approximate roll and spiral mode eigenvalues and the Dutch roll mode natural frequency and damping ratio using the approximations given in Lecture 20. Compare with the exact values.

	λ (rad/s)	t_{half} (s)
Roll, Approximate		
Roll, Actual		
Spiral, Approximate		
Spiral, Actual		

	ω_n (rad/s)	ζ	t_{half} (s)	N_{half} (cycles)
Dutch Roll, Approximate				
Dutch Roll, Actual				

Discussion: