

UNIVERSITY OF NOTRE DAME
Department of Aerospace and Mechanical Engineering
AE 440: Flight Mechanics and Introduction to Design
Fall 1998

Project #8

Due: Friday, October 9, 1998

You are asked to perform a "level-zero" sizing trade study for a proposed general aviation concept. This will be a 4 passenger aircraft and a specific power plant has been selected. The performance requirements or target specification are:

Four passengers with a limit of 30 lbs of baggage per passenger
Cruise speed of 250 mph at an altitude of 8000 ft.
Range of 1000 mi (with 1 hr loiter, 200 mi diversion and 6% reserve)
Stall speed of 60 mph
Limit load factor - 3.8
Single engine with weight 220 lb
Specific fuel consumption - 0.45 lb/(hr/HP)
Nominal propeller efficiency - 0.88

You can use the LEVEL0 system analysis code provided in the AE440 course folder on the AFS server (<usr/local/courses/aero/ae440>) to assist in this study.

1. Select a fuselage geometry for your design to meet your payload requirements.
2. Develop carpet plots to demonstrate the dependence of gross takeoff weight, and any other parameters you deem important, on your choice of CL_{max} and wing aspect ratio. Assume CL_{max} is in the range 1.4 - 2.0 and aspect ratio in the range 5 - 10.
3. Select and justify choices for each of these design variables based upon this study. Make sure you describe how you are defining "merit" and constraints for this study.