Final Project for Aircraft Structural Mechanics

Final Report Due: Wednesday, January 4, 2023

I. Problem

1. Find a problem in structural analysis, for example, analysis of mechanical parts in an aircraft or a drone (check www.3dcontentcentral.com for available CAD models);

2. Identify the structure and loads, and problems to be analyzed;

3. Construct adequate FEM models for the structure;

4. Perform static stress analysis on the FEM model under the considered loads;

5. Perform dynamic and/or buckling analyses (for example, find the first 10 vibration frequencies and modes of the structure); *or* a fatigue analysis (find the maximum stresses and the fatigue life of the structure).

The goal is to use the light material for the structure whenever possible (for example, change the sizes and shapes of the structure members), while keep the stiffness, strength, and stability of structure within the safe range (assume a factor of safety of 1.5, and a value of maximum displacement of 1%).

II. Final Report

Write a final report that includes:

1. A *two-page* write-up on:

   1) *Description of the Problem*;

   2) *The FEM Model* for the structure (type of elements used, materials, loads and constraints, type of analyses, etc.);

   3) *Results* (tables and descriptions of the results);

   4) *Recommendations* (for improving the design, based on the FEM results, etc.);

   5) *Discussions* (usefulness and limitations of FEM, lessons learnt, etc.).

2. Attach plots of the models, deformed shapes, stresses, vibration and/or buckling modes, and others, for the finalized design of the structure.

III. Presentation

You will need to present your work in class during the exam week (January 4, 2023).