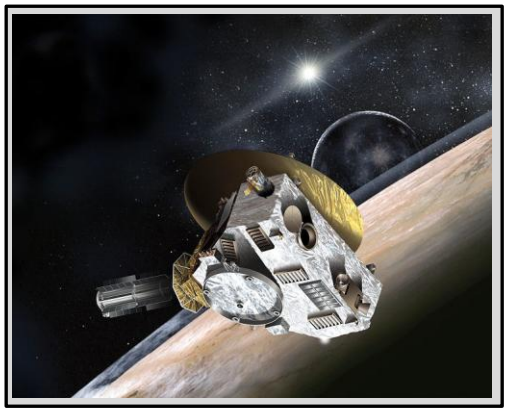

EGS 2321 - Engineering Analysis: Dynamics

Introduction

Overview

- Introduction
- What is Dynamics ?
- What to expect in this class.

Mechanics

- *Mechanics* is a branch of physics concerned with the behavior of objects that are at rest or in motion and subjected to the action of forces.
- Mechanics can be broadly subdivided into *Statics* and *Dynamics*
- Statics is a branch of mechanics that is concerned with the study of bodies that are in equilibrium, that is, either at rest or in motion with constant velocity.

Dynamics

- *Dynamics* is a branch of mechanics that studies the motion of bodies subject to acceleration.
- Dynamics can be subdivided to include topics such as *kinematics*, and *kinetics*.
- Kinematics is concerned with the geometry of the motion, whereas kinetics is concerned with methods to analyze the forces causing the motion.

Brief History of Dynamics

Major contributors include:

- Galileo Galilei (156 4 – 16 42): pendulums, falling bodies
- Sir Isaac Newton (1642 – 1727): Laws of motion, law of universal gravitation
- Others include: Kepler, Huygens, Euler, Lagrange, Laplace, D'Alembert and many others

A detailed history of dynamics can be found here

Applications of Dynamics

- Structural design of ANY vehicle: auto, train, aircraft, etc.
- Mechanical devices: motors, pumps, turbines, power tools, industrial equipment, machinery etc etc
- Prediction of motion of: satellites, projectiles, spacecraft, and many others
- And many other engineering problems whose solution requires the application of the principles of dynamics

Prerequisite Knowledge

- Success in grasping many of the methods and techniques is based on previous knowledge and experience in many fields including:
  - Algebra
  - Trigonometry
  - Geometry
  - Calculus (Differentiation, Integration)
  - Vectors
- See review topics in Appendix of textbook

How to Pass This Class

- Dynamics is an involving field of study, and requires critical thinking and a meticulous approach.
- The most effective way to study the course material is to ***solve problems***.
- Reading course texts and problem solutions alone will be of limited value. You must work the problems on your own.
- Pay attention in class, ask questions. From home you may email me at any time.

Problem Solving 101

1. Read the problem thoroughly, and try to associate the information and scenario with a theory you have studied.
2. Draw any relevant diagrams or tables.
3. Establish a coordinate system and apply the relevant principle, in mathematical form.
4. Solve the relevant equation by algebra, and append the correct units to your answer.

Problem Solving 101

5. Study your answer, and ask yourself, “…is my answer reasonable?..”, “…does it make sense?...”
6. Review the problem and consider other ways the same solution could have been obtained.

Problem Solving

- Caution!: Yes, you will make errors, get mad, and frustrated, but it is what it is.
- Neat and organized presentation of your solutions is an indication of clear and organized thinking.
- You may use software applications you have learned in other classes, such to *Mathcad*, *Matlab* and others.

Assessment

The course assessment will include the following:

- Quizzes: Weekly. Open book open notes. Typically one problem, 10 – 15 minutes
- Homework Assignments
- Tests: Monthly. Closed book. Formula sheet allowed, 45 mins – I hour. Covers work from that month
- Final : comprehensive exam, structured same as the tests

How Did That Go ?