

# Spacecraft Attitude Dynamics - Computer Project

ASTE586

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Spring 2025

## Goals

- Simulate a physical system via numerical integration of ordinary differential equations.
- Gain experience simulating rotational dynamics.
- Gain experience in translating between physical properties and parameters for the simulation, like initial conditions for the Euler parameters and angular velocity.
- Interpret simulation results with physical descriptions.
- Demonstrate understanding of concepts from class.

## Guidelines

- Use software and programming language(s) you are comfortable with.
- Don't use your own numerical integration software. You should really get used to using integration routines like Netlib's ODEPACK, MATLAB's ODE45, or for whichever programming language you're using. Libraries like these have been debugged through use by many other users and often have features that will save your skin one day.
- Do not use an automated symbolic solver like 'dsolve' of Mathematica or MATLAB.
- There is no required report format. Use fonts and line space as you see fit. Just be sure to include all requested plots and discussion.
- Plots should be appropriately labeled. Reported numbers and plots should include units. You should include some discussion of your results in your report.
- I shouldn't have to read your code to try and figure out your results. Your results should be reported clearly in the text of the report. Results that are not specifically called out in the text of your report, will not be considered incomplete.
- The report is due at on April 28, 2025 so that it may be discussed in class.
- Instead of giving you the whole project description at once, I'm giving it out in parts. Parts one and two will be due as announced. I'll be discussing the project as we go along in class and I'm happy to give you non-graded feedback on your intermediate work.
- Please do *not* submit your report as a Microsoft Word or Powerpoint document. PDF is preferred, but not required. Postscript, HTML, or any other "open" format is likely fine.

## Grading

- comments in code contribute to your grade (but you won't get a better grade by deleting your comments)
- Are the requested plots in the report?
- Are all questions answered?
- Obviously, there's a certain answer I'm hoping for from each question. If your answer isn't what I was looking for but it is relevant, stated well, makes sense, and is physically correct, then you'll get credit for it.