Team Anant Probation Notes - Attitude Determination and Control Subsystem(ADCS)

Pranav Chandra N V
2023AAPS0013P

12th February 2024

1   Control Systems

- Deals with changing the attitude and position of the satellite.

- We start with our most basic definition. A **system** is any*thing* that can change by virtue of the application of external and internal forces.

- A signal in this particular case is essentially any partcular quantity that we might be able to measure from the system.

- Control systems operate with differential equations.

1.1   Block Representation of a System

- We generally use block diagrams to represent systems.

    - **Arrow** - Represents a signal.
    - **Gain Block** - Gives us how the system will change the system at a certain point.
    - **Sum Block** - Takes in two signals and outputs a single signal.

- A system may have various types of gain blocks. To completely explain a system, you'd need all its arrows and gain blocks.

- A closed loop control system is where some kind of feedback is taken back to the input or one of the gain/sum blocks to change the output.

- Open loop control systems don't give us any feedback to incorporate into the output, while closed loop control systems do.

- They have specific representation and syntax that has to be kept in mind.

1.2   The Laplace Domain

- Analysis and solving differential equations for control systems is complicated in the standard domain.

- Instead, we transform points in time to points in the S domain.

- This transformed domain is known as the Laplace Domain. It simplifies calculations.

- By applying Laplace transformations, we obtain polynomials that are easier to solve than differential equations.