POLITECNICO
MILANO 1863

Spacecraft Attitude Dynamics and Control
Spacecraft Attitude Dynamics

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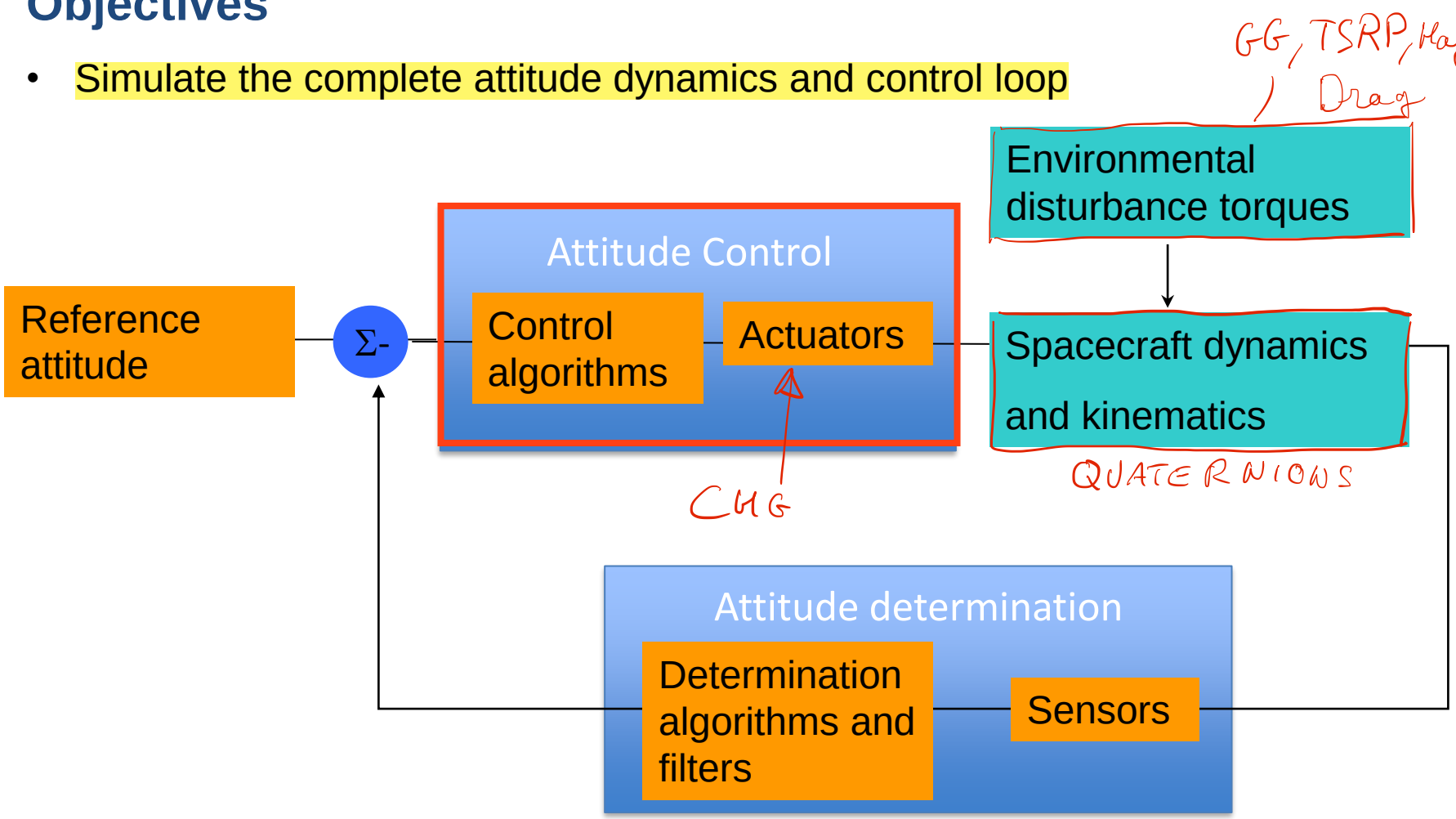
Instructions for projects

Objectives

- Simulate the complete attitude dynamics and control loop



- Show and quantify that the attitude control improves the pointing performances with respect to the uncontrolled case. Define at least 1 performance parameter and make statistical analysis on it.

Project specifications

- Orbit specifications NOT assigned (you can use the orbit of your Orbital Mechanics assignment)
- Shape and inertia of the spacecraft NOT assigned, you select them (justify selection)
- Pointing requirements NOT specified, you should define them (justify selection)
- You are expected to model the attitude dynamics including at least 2 perturbing torques, selecting the most relevant for your orbit and spacecraft shape (justify selection)
- Attitude parameters assigned, you are expected to use those to simulate attitude kinematics → QUATERNIONS
- One sensor assigned, you are expected to use this and eventually add any other sensor, if needed (justify choice) → Sun Sensor, ADD GYRO TO KEEP ATTITUDE DET. in ECLIPSE STATUS
- Actuators assigned, you are expected to use those and eventually add any other actuator, if needed (justify choice)
- Control logic NOT assigned, choose one and implement it
- Simulate at least one full orbit

Report Structure

- **Length –** maximum 20 pages, font size 12, single column
- **Figure** – Block scheme of the ADCS architecture (e.g. sensors + actuators + controller + algorithms + kinematics)
- **Model description –** models used and assumptions
- **Control and determination algorithms –** justify choices
- **Results** – Clear plots with axes labels and units, compare and contrast algorithms
- **References -** all material used, including theoretical and data of the hardware

Define notation used, do not copy and paste Simulink diagrams or plots.

USE MATLAB FOR PLOTS AND TIKZ for DIAGRAM

Report Delivery

- Report delivery via the delivery folder on Beep
- Deadline for delivery is 1 week before the exam (delivery folder will be closed after that date)
- Deliver project report in pdf format and Simulink code in a separate zip file
- PLEASE use these names for the files you upload:
    - YourPersonCode_YourFamilyName.pdf (example 11001010_Bernelli.pdf) for the project report
    - YourPersonCode_YourFamilyName.zip (example 11001010_Bernelli.zip) for the Simulink files