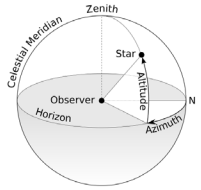
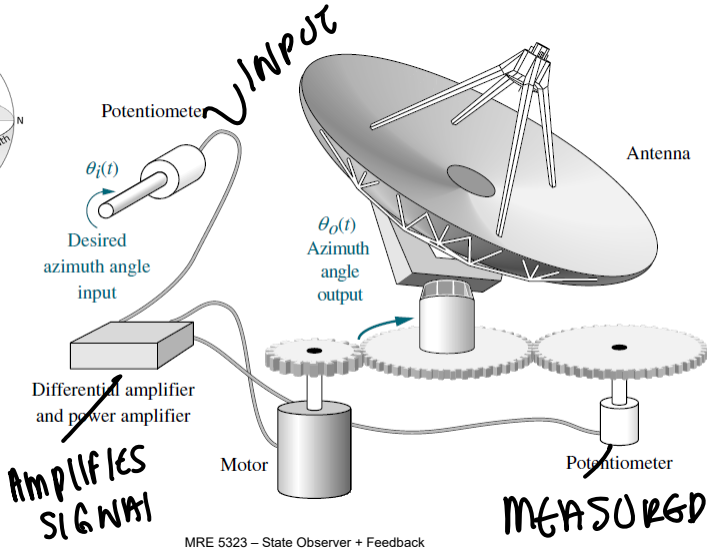
STATE OBSERVER + FEEDBACK

CASE STUDY: ANTENNA CONTROL

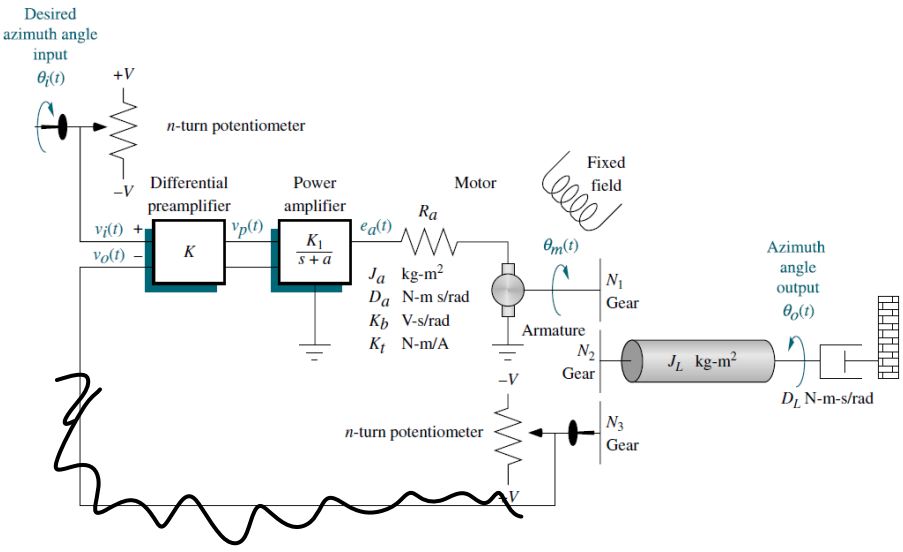
DIAGRAMS AND MODEL TAKEN FROM "CONTROL SYSTEMS ENGINEERING" BY NISE (6TH EDITION)

THE AZIMUTH ANGLE OF A RADIO TELESCOPE ANTENNA IS TO BE CONTROLLED

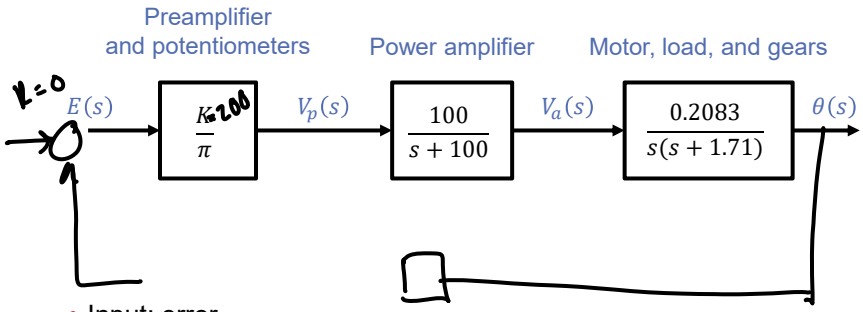




A SCHEMATIC OF THE SYSTEM IS PROVIDED



THE PREAMPLIFIER GAIN IS SET TO 200 AND THE EXISTING FEEDBACK IS REMOVED



- Input: error
- Output: azimuth angle
- Internal states are not known

DESIGN STEPS

1. Model the system in state space
2. Is the system fully controllable?
3. Design state feedback for settling time less than 1 second and less than 10% overshoot
4. Is the system fully observable?
5. Design state observer at least 10 times faster than CL poles
6. Validate the separate state observer and state feedback in Simulink
7. Combine the state observer and state feedback into a single output feedback compensator
8. Validate the output feedback compensator in Simulink