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Continuing Education Course #358
Sightline Control Basics - Part 1
Geo-Pointing and Locating

1. The line of sight is defined as a vector between points on an observation platform and an observed target location in?
 - a. a local coordinate frame
 - b. a basic coordinate frame
 - c. an inertial referenced coordinate frame

2. Sightline control (SLC) can be considered a ____ part problem?
 - a. Two
 - b. Three
 - c. Four

3. Parts of the SLC problem include?
 - a. LOS Track/Point and Gimbal Friction
 - b. LOS Track/Point and LOS stabilization
 - c. LOS stabilization and Camera distortion

4. Disturbances to the LOS are characterized by?
 - a. offset only
 - b. bias only
 - c. jitter and bias

5. What is required to evaluate pointing performance and the design tradeoffs to meet pointing performance?
 - a. A LOS calculator
 - b. A generic servo loop
 - c. A pointing metric

6. With direct LOS stabilization, inertial sensors are mounted directly on the?
 - a. Platform longitudinal axis
 - b. Gimbal base
 - c. LOS

7. With indirect LOS stabilization, the LOS rate (LOSR) is?
 - a. sensed directly
 - b. calculated
 - c. not needed

8. The key to LOS stabilization is?
 - a. an inexpensive gimbal
 - b. a mega-pixel camera
 - c. LOSR feedback

9. Rate servo loop gain is proportional to disturbance?
- a. amplification
 - b. jitter and bias
 - c. rejection
10. The rigid body equations define the?
- a. angular motion of a gimbaled pointing structure
 - b. LOS dynamics
 - c. both
11. A DCM is a?
- a. Direction Cosine Matrix
 - b. Key to defining the orientation of a pointing vector
 - c. both
12. For the two axis gimbal example in Section 4.0 the block diagram in Figure 14.0 shows the?
- a. Two-axis Gimbal LOS Rate Feedback Control Loop
 - b. Two-Axis RBE Block Diagram
 - c. Two-Axis Gimbal SLC Control System Block Diagram for Geo-Pointing
13. For two axis gimbal example in section 4.0 the block diagram in Figure 16.0 shows the?
- a. Two-axis Gimbal LOS Rate Feedback Control Loop
 - b. Two-Axis RBE Block Diagram
 - c. Two-Axis Gimbal SLC Control System Block Diagram for Geo-Pointing
14. The two axis gimbal example in section 4.0 used an inertia matrix with?
- a. all principle and off-axis inertia terms
 - b. only one value
 - c. only principle axis inertias
15. For the two axis gimbal example in Section 4.0 the block diagram in Figure 18.0 shows the?
- a. Two-axis Gimbal LOS Rate Feedback Control Loop
 - b. Two-Axis RBE Block Diagram
 - c. Two-Axis Gimbal SLC Control System Block Diagram for Geo-Pointing
16. In Section 5.0, the DCM between inertial coordinate frame and LOS coordinate frame is used to derive?
- a. The azimuth relative gimbal rate
 - b. The elevation relative gimbal rate
 - c. LOSR for the two-axis gimbal example
17. In Section 5.0, the key to the LOSR derivation is division of the DCM into how many terms?
- a. 4
 - b. 2
 - c. 3
18. Mirrors are important in SLC as they provide for the use of large sensor suites with?
- a. less pointing gimbal SWaP
 - b. better pointing performance
 - c. both
19. Mirrors have unique characteristics that must be addressed to achieve their performance potential; including optical angle gain and?

- a. image rotation
 - b. direct platform disturbance coupling
 - c. both
20. IMU is an abbreviation for?
- a. Inertial Measurement Unit
 - b. Inner-axis Measurement Units
 - c. Inertial MEMS Unit
21. An IMU measures?
- a. inertial position
 - b. altitude
 - c. inertial rate
22. An Inertial Navigation System (INS) measures?
- a. inertial angular position and with a GPS, location
 - b. relative angular position
 - c. relative angular rate
23. Recommended motor types for LOS stabilization are?
- a. Direct drive brush or brushless
 - b. Motors with gear drives
 - c. Motors with belt drives
24. In Section 8.0 Geo-Pointing, how many coordinate frames are used to rotate a position vector from ECEF to LOS coordinates or the inverse; also illustrated in Figure 23.0?
- a. 6
 - b. 5
 - c. 4
25. The DCM used in calculating a Geo-Pointing solution is determined using data from?
- a. INS only
 - b. INS and gimbal angles only
 - c. GPS, INS, and gimbal angles

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