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Continuing Education Course #359
Sightline Control Basics - Part 2
Geo-Pointing and Locating

1. LOS stabilization?
- a. isolates the sensor from platform motion to stabilize the operating environment
- b. rejects disturbances due to platform motion to achieve the desired track/pointing accuracy
- c. both

2. Pointing error is the difference between?
- a. the actual LOS orientation and the sensor pointing vector to the target
- b. angle between the azimuth axis and platform
- c. angle between the azimuth and elevation axes

3. For the simple two-axis gimbal configuration shown in Figure 2.0, a NADIR condition occurs when the elevation angle, E, is equal to?
- a. E=0°
- b. E=45°
- c. E=90°

4. For the three-axis gimbal design block diagram in Figure 4.0 the inner axes are?
- a. cross elevation and elevation
- b. azimuth and cross elevation
- c. azimuth and elevation

5. The jitter and bias disturbance environment is characterized in an?
- a. list of only jitter errors
- b. list of only bias errors
- c. error allocation distribution and a final error budget

6. A pointing metric is?
- a. required in the error budget
- b. required to evaluate pointing performance and design tradeoffs to meet performance
- c. not required

7. An illustration of jitter and bias pointing error is provided in?
- a. Figure 5.0
- b. Figure 6.0
- c. Figure 7.0

8. The SLC Performance Evaluation Process is illustrated in?
- a. Figure 5.0
- b. Figure 6.0

○ c. Figure 7.0

9. An Inertial Navigation System (INS) measures?
○ a. inertial angular position and with GPS location
○ b. relative angular position
○ c. relative angular rate

10. An INS is effectively an?
○ a. relative rate sensor
○ b. IMU with integrated outputs from a navigation algorithm (i.e. Attitude and Navigation Equations).
○ c. relative angle sensor

11. An example of a relative angle position sensor is an?
○ a. IMU
○ b. gyro
○ c. resolver

12. The most often used geo-location coordinate frames are?
○ a. earth centered earth fixed (ECEF) amplification
○ b. earth centered inertial (ECI). jitter and bias
○ c. both

13. What coordinate frame is more often used for representing position and velocity of terrestrial objects?
○ a. ECEF
○ b. ECI
○ c. LOS

14. The DCM used to rotate a vector between LOS and ECEF coordinate fames, shown following Figure 9.0, consists of a sequence of how many intermediate coordinate frame DCMs?
○ a. 2
○ b. 3
○ c. 4

15. For the target geo-pointing problem, the target vector in ECEF coordinates is the sum of platform position in ECEF coordinates plus?
○ a. the measured relative gimbal angles
○ b. the measured relative target position vector
○ c. platform angular rate vector

16. The typical measurements required for geo-pointing are?
○ a. GPS platform and target location of platform; platform orientation (heading, pitch, roll)
○ b. Gimbal orientation of respective gimbal angles; sensor pointing error information
○ c. both pairs

17. In general, geo-pointing errors or deviations can be categorized as those associated with?
○ a. the measured angles in the DCM sequence due to the gimbal/platform sensors
○ b. the platform location in ECEF coordinates caused by GPS location accuracy relative to the pointing vector
○ c. both

18. Alignment between the INS and IMU is often termed?
○ a. INS to platform alignment
○ b. INS to IMU Transfer Alignment

○ c. IMU to Gimbal alignment

19. Alignment parameters relating the coordinate frames for the two sensors are obtained by measuring errors between sensors and then calculating displacement angles to relate coordinate frames which are used to populate an?
○ a. Alignment Matrix
○ b. Alignment gain
○ c. Alignment equation

20. Geo-location geo-registration can be performed via ____ methods?
○ a. 4
○ b. 3
○ c. 2

21. Which is not a Geo-Location method?
○ a. GIS
○ b. image geo-registration
○ c. direct geo-registration

22. Image geo-registration is a geo-referenced application of?
○ a. direct geo-registration
○ b. image registration using geo-referenced image data
○ c. least squares analysis

23. What is a key element of most image processing architectures?
○ a. camera model
○ b. resolver model
○ c. encoder model

24. Most image geo-registration architectures use which algorithms?
○ a. feature extraction, matching
○ b. alignment, and correlation processing
○ c. both pairs

25. Inertial image processing architectures vary but generally follow a ____ step sequence?
○ a. 3
○ b. 5
○ c. 4