CLAIMS

1. A payload including a gimbal assembly and associated gyro assembly, comprising

   a gyro assembly control associated with said gyro assembly and operable to trigger the gyro assembly to obtain deviation measurements in the azimuth plane and elevation plane and process the measurements in a first dynamic range corresponding to a first rotation rate range, for stabilizing the payload utilizing said gimbal assembly;

   the gyro assembly control being operable to trigger the gyro assembly to obtain instantaneous measurements and process the measurements in a second dynamic range corresponding to a second rotation rate range having different sensitivity than said first dynamic range, for finding deviation of the payload from the north of the earth.

2. The payload according to Claim 1, wherein said gyro assembly includes an azimuth rate gyro and an elevation rate gyro disposed perpendicularly thereto;

   said gyro assembly control being operable to drive said elevation rate gyro to rotate about azimuth axis for obtaining and recording instantaneous measurements during at least 360° rotation; said gyro assembly control being further operable to derive a wander angle representative of said deviation from the north based on said recorded measurements.

3. The payload according to Claim 2, wherein said gyro assembly control module is configured to calculate a sine wave that fits said measurements and derives said wander angle from said sine wave.

4. The payload according to Claims 2 or 3 wherein the longer the duration of said rotation about said azimuth axis, the lower the error of said measurements.

5. The payload according to any one of Claims 2 to 4, wherein said measurements yield:

   $\text{Measurements} = \Omega * \cos(\varphi) * \cos(\alpha)$,

   where Ω stands for the earth rotation rate

   φ stands for the latitude

α stands for the wander angle that changes according to instantaneous measurements of the elevation rate gyro during the at least 360° rotation,

and wherein said deviation being a phase shift α of the sine wave that fits said measurements.

6. The payload according to any one of the preceding Claims, further comprising a tilt sensor for sensing tilt measurements of the payload in either or both of roll and pitch axes, and wherein said gyro assembly control is configured to calculate compensation commands for transmission to said gimbal assembly for reducing or elimination said tilt measurements, whereby said payload is rendered leveled.
7. The payload according to any one of the preceding Claims wherein said payload is fitted on a mobile platform that is subjected to spatial orientation deviations in either or both of azimuth plane or elevation plane, and wherein said spatial deviations are measured by said gyro assembly and wherein said measurements are processed by said gyro assembly control to obtain compensation commands for triggering the gimbal assembly to compensate for said spatial deviations and stabilize the payload.
8. The payload according to any one of Claims 2 to 6, wherein said payload is fitted on a mobile platform that is subjected to spatial orientation deviations in either or both of azimuth plane or elevation plane, and wherein said spatial deviations in the azimuth plane are measured by said azimuth rate gyro irrespective of said 360° rotation and wherein said spatial deviations in said elevation plane are measured by said elevation rate gyro irrespective of said 360° rotation and wherein said measurements are processed by said gyro assembly control to obtain data for triggering the gimbal assembly to compensate for said deviations and stabilize the payload.
9. The payload according to any one of the preceding Claims, wherein said sensitivity is dependent upon the rotation rate of the gyros in the stabilization mode of operation.
10. The payload according to Claim 9, wherein the rotation rate is 100[°/s].
11. The payload according to any one of the preceding Claims, wherein said sensitivity is dependent upon a tradeoff parameter.
12. The payload according to Claim 11, wherein said tradeoff parameter is 5%.

13. A method for dual mode utilization of a payload that includes a gimbal assembly and associated a gyro assembly, comprising:

(i) triggering the gyro assembly to obtain deviation measurements in the azimuth plane and elevation plane and process the measurements in a first dynamic range corresponding to a first rotation rate range, for stabilizing the payload utilizing said gimbal assembly; and

(ii) triggering the gyro assembly to obtain instantaneous measurements and process the measurements in a second dynamic range corresponding to a second rotation rate range having different sensitivity than said first dynamic range, for finding deviation of the payload from the ~~magnetic~~ north of the earth.

Claims

1. A payload (200) including a gimbal assembly (203) and associated gyro assembly (201), comprising a gyro assembly control (202) associated with said gyro assembly (201) and operable to trigger the gyro assembly (201) to obtain deviation measurements (204) in the azimuth plane and elevation plane and process the measurements in a first dynamic range corresponding to a first rotation rate range, for stabilizing the payload utilizing said gimbal assembly (203); characterised by the gyro assembly control (202) being operable to trigger the gyro assembly (201) to obtain instantaneous measurements from an elevation rate gyro (105) and process the measurements in a second dynamic range corresponding to a second rotation rate range having more sensitivity than said first dynamic range, for finding deviation of the payload from the north of the earth.

2. The payload according to Claim 1, wherein said gyro assembly (201) includes an azimuth rate gyro (104) disposed perpendicularly to the elevation rate gyro (105); said gyro assembly control (202) being operable to drive said elevation rate gyro (105) to rotate about azimuth axis for obtaining and recording instantaneous measurements during at least 360° rotation; said gyro assembly control (202) being further operable to derive a wander angle representative of said deviation from the north based on said recorded measurements.

3. The payload according to Claim 2, wherein said gyro assembly control (202) is configured to calculate a sine wave that fits said measurements and derives said wander angle from said sine wave.

4. The payload according to Claims 2 or 3 wherein the longer the duration *t* of said rotation about said azimuth axis, the lower the error of said measurements.

5. The payload according to any one of Claims 2 to 4, wherein said measurements yield:

$$\text{Measurements} = \Omega * \cos(\varphi) * \cos(\alpha),$$

where Ω stands for the earth rotation rate

ϕ stands for the latitude

α stands for the wander angle that changes according to instantaneous measurements of the elevation rate gyro (105) during the at least 360° rotation,

and wherein said deviation being a phase shift α of the sine wave that fits said measurements.

6. The payload according to any one of the preceding Claims, further comprising a tilt sensor for sensing tilt measurements of the payload in either or both of roll and pitch axes, and wherein said gyro assembly control (202) is configured to calculate compensation commands for transmission to said gimbal assembly (203) for reducing or elimination said tilt measurements, whereby said payload is rendered leveled.

7. The payload according to any one of the preceding Claims wherein said payload is fitted on a mobile platform that is subjected to spatial orientation deviations in either or both of azimuth plane or elevation plane, and wherein said spatial deviations are measured by said gyro assembly (201) and wherein said measurements are processed by said gyro assembly control (202) to obtain compensation commands for triggering the gimbal assembly (203) to compensate for said spatial deviations and stabilize the payload.

8. The payload according to any one of Claims 2 to 6, wherein said payload is fitted on a mobile platform that is subjected to spatial orientation deviations in either or both of azimuth plane or elevation plane, and wherein said spatial deviations in the azimuth plane are measured by said azimuth rate gyro (104) irrespective of said 360° rotation and wherein said spatial deviations in said elevation plane are measured by said elevation rate gyro (105) irrespective of said 360° rotation and wherein said measurements are processed by said gyro assembly control (202) to obtain data for triggering the gimbal assembly to compensate for said deviations and stabilize the payload.

9. The payload according to any one of the preceding Claims, wherein said sensitivity is dependent upon the rotation rate of the gyros in the stabilization mode of operation.

10. The payload according to Claim 9, wherein the rotation rate is 100[°/s].

11. The payload according to any one of the preceding Claims, wherein said sensitivity is dependent upon a tradeoff parameter.

12. The payload according to Claim 11, wherein said tradeoff parameter is 5%.

13. A method for dual mode utilization of a payload that includes a gimbal assembly (203) and associated a gyro assembly (201), comprising:

(i) triggering the gyro assembly to obtain deviation measurements in the azimuth plane and elevation plane and process the measurements in a first dynamic range corresponding to a first rotation rate range, for stabilizing the payload utilizing said gimbal assembly; and characterised by

(ii) triggering the gyro assembly to obtain instantaneous measurements from an elevation rate gyro and process the measurements in a second dynamic range corresponding to a second rotation rate range having more sensitivity than said first dynamic range, for finding deviation of the payload from the north of the earth.