Abstract

The application of inertial stabilization system is to stabilize the sensor’s line of sight toward a target by isolating the sensor from the disturbances induced by the operating environment. The purpose of this paper is to present a model of control servo system for one axis gimbal mechanism using fuzzy PID type controller. The gimbals torque relationships are derived using Newton’s law considering the base angular motion and dynamic unbalance. Then, the stabilization loop is constructed and the proposed fuzzy controller is designed. The overall control system is simulated using MATLAB/Simulink, then the system performance is investigated in different cases for both conventional PI and fuzzy PID controller. A comparison study is made based on some performance criteria. The results obtained in different conditions confirms that a further improved system performance can be achieved using the proposed fuzzy controller as compared to the conventional PI controller. The simulation results proves the efficiency of the proposed fuzzy controller which offers a better response than PI one, and improves further the transient and the steady-state performance.
References

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Index Terms

Computer Science
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Keywords

Gimbal System
Rate Gyro
Line of Sight
Stabilization Loop