Target pointing of rigid spacecraft with two control torques under attitude sensor failure situations

Cheon Y.-J., Kim J.-H.

School of Electrical Engineering and Computer Science, Korea Advanced Institute of Science and Technology, Daejeon, 305-701, South Korea

Abstract: We consider a target pointing problem of a spacecraft which has fewer control torques than the degrees of freedom to be controlled. In addition, we consider the failures of attitude sensors. To overcome such failure situations, a novel method to represent control error, without applying any complicated attitude estimation algorithm, is proposed using geomagnetic field measurements. The proposed error representation does not require any toque on an axis which loses control. We derive a feedback control law that globally and asymptotically stabilizes the spacecraft about the underactuated spacecraft axis along the specified target direction in an inertial frame. Simulation was carried out and results are presented illustrating the efficacy of the proposed algorithm under the condition of measurement uncertainties and environmental disturbances. © 2009 SICE.

Author Keywords: Actuator failure; Attitude sensor failure; Geomagnetic filed measurements; Spacecraft target pointing; Underactuated control; Underactuated systems

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Authors with affiliations:

1. Cheon, Y.-J., School of Electrical Engineering and Computer Science, Korea Advanced Institute of Science and Technology, Daejeon, 305-701, South Korea
2. Kim, J.-H., School of Electrical Engineering and Computer Science, Korea Advanced Institute of Science and Technology, Daejeon, 305-701, South Korea