Abstract

The most important problems in satellites are their energy supply and decreasing weight. One of the solutions is using flexible appendages. Flexibility can supply both energy and weight loss in satellites. Also other appendages like antennas and mechanical arms can be flexible. But flexibility can produce some vibrations. These vibrations cause complexity attitude control systems due to flexible appendages.

In this paper, the attitude control of flexible satellite by using four reaction wheels in presence of gravity gradient and orbit frequency has been considered. The dynamic of flexible appendages have been derived from energy equations and Lagrange method. Also, momentum management and minimization of the momentum have been employed to avoid of reaction wheels saturation. Then, the control command law using the quaternion error vector for attitude control of rigid body and sliding mode control (SMC) for active suppression of flexible appendages have been used. Finally the performance of control system between presence and absence of reaction wheels has been compared.
References


Index Terms

Computer Science  Applied Sciences

Keywords
Flexible satellite, Three-axis attitude control, Sliding mode control, Reaction wheel, Momentum management