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Authors:

Farhad Fani Saberi

Mehdi Zandieh

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Abstract

The satellite thruster's configuration plays also an important role in providing the attitude control torques. In this paper, after discussing the gimbal thruster's structure and its benefits, several configurations based on 2, 3 and 4 gimbal thrusters are investigated in order to identify the most suitable orientation that consume less fuel and raise reliability. Then, a 3-axis attitude controller based on proportional-derivative control law is applied to satellite dynamics under these configurations. All the configurations are analyzed in terms of their torque workspace (controllable directions), attitude control performances and gimbal angles changes. The results show that the 4-thrusters configuration is more reliable and gimbal angles changes are smoother.

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Index Terms

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Keywords

Gimbal reaction thrusters; 3-axis attitude control; Torque workspace; Gimbal angles; Proportional-derivative controller