

To avoid internal singularities when a single gimbal control moment gyros (SGCMGs) system steers, a new steering law based on appending gimbal rates is designed in this paper. Firstly, with analyzing the relation between the desired torque projection and the SGCMGs' angular momentum when the system is near singularity, appending gimbal rates for the SGCMGs whose angular momentum are close to the desired torque is proposed to avoid internal singularities. Then the singular values decomposition theory is adopted to analyze the output torque error, and prove that there is no gimbal lock phenomenon for the proposed steering law. Finally, as an example, simulations for the designed steering law are accomplished on a pyramidal SGCMG system. The results show that the designed steering law could avoid and escape internal singularities effectively, and produce little torque error.

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附加框架角速度的SGCMG操纵律设计

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Steering Law Design for SGCMG System Based on Appending Gimbal Rates

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