

Control of a Stewart Platform for Minimizing Impact Energy in Simulating Spacecraft Docking Operations

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Abstract : Three control algorithms, proportional-integral-derivative, linear-quadratic-Gaussian, and linear-quadratic-Gaussian with the shift, were applied to the computer simulation of a one-directional dynamic model of a Stewart Platform. The goal was to compare the dynamic system responses under the three control algorithms and to minimize the impact energy when simulating spacecraft docking operations. Equations were derived for the control algorithms and the input and output of the feedback control system. Using MATLAB, Simulink diagrams were created to represent the three control schemes. A switch selector was used for the convenience of changing among different controllers. The simulation demonstrated the controller using the algorithm of Linear-Quadratic-Gaussian with the shift resulting in the lowest impact energy.

Keywords : controller, Stewart platform, docking operation, spacecraft

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