Track-position and vibration control simulation for strut of the Stewart platform

Stewart平台支架跟踪及振动系统的仿真

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Main goal of this paper

Design a track-positioning controller to obtain fine pointing during mission and evaluate the vibration control system under the expected disturbance source of the reaction wheel. Moreover, the vibration control system uses the characteristics of strut including active and passive control elements to attenuate the vibration.

Main aspects involved in this paper

A piezoelectric ceramic and a voice coil actuator dynamics model for decoupling analysis and system analysis.

The PID controller actuating rod for tracking control of the Stewart platform.

Prediction of the strut performance using the strategy implemented by a linear quadratic regulator (LQR) algorithm.

Numerical simulation analysis and results

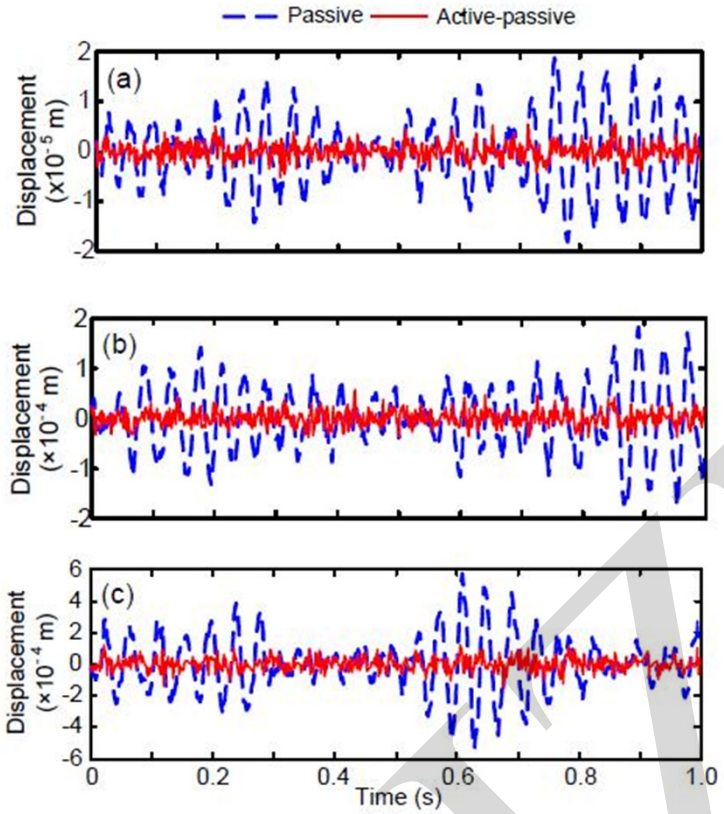

Fig Comparison of passive control and active-passive control of the displacement response at 500 r/min (a), 1500 r/min (b), and 2500 r/min (c)

The peak value of displacement under the active-passive control condition is decreased obviously.

The vibration affecting the positioning accuracy is attenuated by the designed active-passive control system.

Stewart platform can effectively reduce the response of micro vibration system through the LQR optimal control algorithm.