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Robust and fault tolerant controller for attitude control of a satellite launch vehicle. (English summary)

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Satellite launch vehicles (SLVs) are used to place artificial satellites and space stations into Earth orbit. The stringent requirement for accurate positioning of the payload in the desired orbit, even under adverse conditions, calls for the design of a robust controller for attitude control of such vehicles. This paper describes the design of such a robust and fault-tolerant control system for the attitude control of a satellite launch vehicle. The robust controller is designed for the nominal system in order to reduce the effect of disturbances in the system. Finally, a reconfigured controller is designed to stabilize the system by placing the closed-loop poles within a desired region and also to guarantee the disturbance attenuation below a certain level. The linear matrix inequality technique is used to design the controllers. The performance of the nominal and reconfigured controller is presented. Recent research has shown that the magnitude and rate saturation nonlinearities can also be taken into account by effectively casting them in LMI forms. The magnitude and rate saturation limits of the actuators for the design of the controller were not included in the present case. This may form an interesting problem for future design.

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