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ON-OFF ATTITUDE CONTROL USING PULSE-WIDTH PULSE-FREQUENCY MODULATED INPUT SHAPER

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Abstract. Kinetic kill vehicle (KKV) is actuated by on-off thrusters to adjust its attitude, how to modulate continuous control commands to on-off or pulse signals to meet the requirements of the thrusters is a challenging task. Pulse-width pulse-frequency (PWPF) modulation is an effective method that provides pseudolinear operation for on-off thrusters. In this work, a new thruster configuration of the KKV and its mathematical model is proposed, good guidelines for the PWPF parameters tuning task is presented, the linear quadratic regulator (LQR) technique in combination with PWPF is used to design the optimal attitude controller. The validity of the proposed methods is demonstrated through the three-axis nonlinear numerical simulations of the KKV of this work.

Keywords. Attitude control; KKV; LQR; Optimal control; PWPF.

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