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Nonlinear extended least squares adaptive feedforward control of a disturbed satellite across multiple maneuvers

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Two adaptive approaches for a non-linear feedforward controller are combined with and sinusoidal trajectory planners in a spacecraft attitude control system. Physics-based feed-forward control, trajectory generation, observers, feedback control, and system stability are discussed in relation to the nonlinear dynamics under simulation. The adaptive feedforward controllers compared include a Recursive Least Square (RLS) method and an Extended Least Squares (ELS) method. A large slew maneuver, a target tracking maneuver, and zig-zag maneuvers are performed and analyzed. Using the RLS method as a baseline, potential improvements gained by incorporating an ELS method are illustrated.

Biography

Matthew A Cooper has completed a MS in Electrical Engineering and a MS in Aeronautical Engineering from the Air Force Institute of Technology, USA, and his MBA from the University of South Dakota, USA. He is a Deputy Program Manager for the Air Force Research Laboratory–Directed Energy Directorate, a premier research organization. His research focus areas are centered on non-linear feedforwad control, optical beam steering, and disturbance rejection techniques.

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