# Sliding Control of Pointing and Tracking with Operator Spline Estimation*

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## Abstract

It is shown in this paper how a variable structure control technique could be implemented to achieve precise pointing and good tracking of a deformable structure subject to fast slewing maneuvers. The correction torque that has to be applied to the structure is based on estimates of upper bounds on the model errors. For a rapid rotation of the deformable structure, the elastic response can be modeled by oscillators driven by angular acceleration, and where stiffness and damping coefficients are also angular velocity and acceleration dependent. By transforming this "slew-driven" elastic dynamics into bilinear form (by regarding the vector made up of the angular velocity, squared angular velocity and angular acceleration components, which appear in the coefficients as the input to the deformation dynamics), an operator spline can be constructed, that gives a low order estimate of the induced disturbance. Moreover, a "worst case" error bound between the estimated deformation and the unknown exact deformation is also generated, which can be used where required in the sliding control correction.

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