

Sector stability criteria for a nonlinear axial motion string system

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Abstract

The paper investigates the exponential stability criterion for an axially moving string system driven by a nonlinear partial differential equation with nonlinear boundary feedback. The control criterion based on a sector condition contains a large class of nonlinearities, which is a negative feedback of the velocity at the right boundary of the moving string. By invoking nonlinear semigroup theory, the well-posedness result of the closed-loop system is verified under the sector criteria. Furthermore, a novel energy like function is constructed to establish the exponential stability of the closed-loop system by using a integral-type multiplier method and the generalized Gronwall-type integral inequality.

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