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Brief Paper

An analysis and design method for linear systems subject to actuator saturation and disturbance â˜†

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Abstract

We present a method for estimating the domain of attraction of the origin for a system under a saturated linear feedback. A simple condition is derived in terms of an auxiliary feedback matrix for determining if a given ellipsoid is contractively invariant. This condition is shown to be less conservative than the existing conditions which are based on the circle criterion or the vertex analysis. Moreover, the condition can be expressed as linear matrix inequalities (LMIs) in terms of all the varying parameters and hence can easily be used for controller synthesis. This condition is then extended to determine the invariant sets for systems with persistent disturbances. LMI based methods are developed for constructing feedback laws that achieve disturbance rejection with guaranteed stability requirements. The effectiveness of the developed methods is

illustrated with examples.

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Keywords

Actuator saturation; Stability; Domain of attraction; Invariant set; Disturbance rejection

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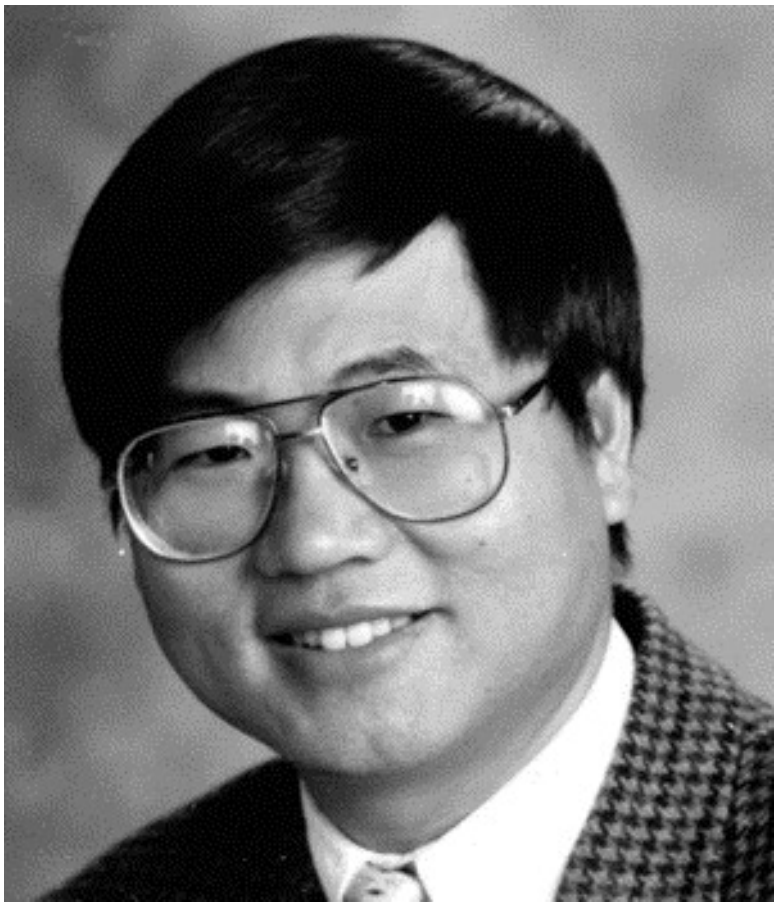

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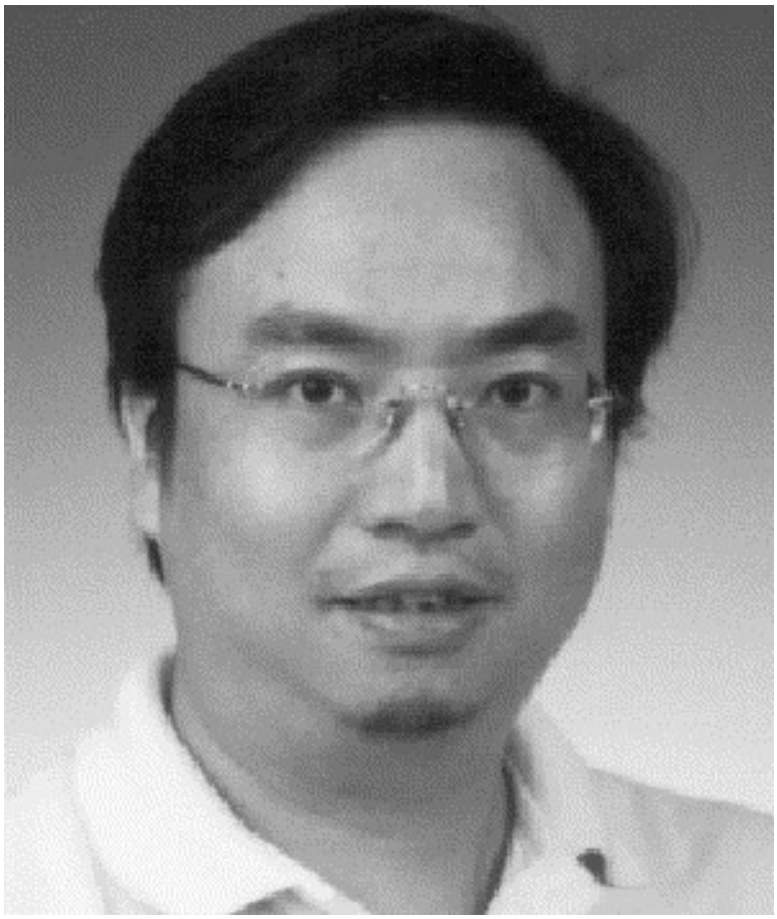

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