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Robust adaptive compensation of biased sinusoidal disturbances with unknown frequency.
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This paper considers asymptotically stable, observable linear systems of order n. The systems are not required to be minimum phase. It is assumed that the systems are affected by an additive noisy sinusoidal disturbance with unknown bias, magnitude, phase and frequency. The authors design a $(2n + 6)$-order output feedback compensator that regulates the output to zero for any initial condition. The compensator generates asymptotically convergent estimates of the biased sinusoidal disturbance and its parameters, including the frequency. Robustness of the closed-loop system with respect to (sufficiently small) unmodeled noise is characterized via input-to-state stability conditions.

A simulated example is used to illustrate the compensation design method, its performance, and its robustness.

Reviewer: William J. Satzer jun. (St. Paul)

MSC:

93C40 Adaptive control/observation systems
93C73 Perturbations in control/observation systems
93B07 Observability
93D25 Input-output approaches in control theory

Keywords:

robust estimation; disturbance rejection; input-to-state stability; adaptive observers; sinusoidal disturbances

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