Sliding Mode Controller-Observer Design for Multivariable Linear Systems with Unmatched Uncertainty.

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Abstract: This paper presents sufficient conditions for the sliding mode control of a system with disturbance input. The behaviour of the sliding dynamics in the presence of unmatched uncertainty is also studied. When a certain sufficient condition on the gain feedback matrix of the discontinuous controller and the disturbance bound holds, then the disturbance does not affect the sliding system. The design of asymptotically stable sliding observers for linear multivariable systems is presented. A sliding observer design ensures that in the presence of unmatched uncertainty, the estimated state nearly approaches the actual state. The error of the approximation depends upon the distance and bound of the unmatched uncertainty. However, certain sufficient conditions should be satisfied for the asymptotic stability of the error system.