

Abstract Submitted
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Observer-based feedback control of transient energy growth: Revisiting the separation principle¹ HUAIJIN YAO, MAZIAR HEMATI, Univ of Minnesota - Twin Cities — Sub-critical transition to turbulence is often attributed to a linear mechanism for transient energy growth. Numerous strategies have been formulated to suppress transient energy growth via feedback control. Usually, in practice, not all states needed for feedback control can be measured directly, so a state observer is used to estimate these states from available sensor measurements. Subsequently, an observer-based feedback law is typically synthesized by invoking the separation principle, which is used to justify independent designs of the controller and estimator. In this talk, we show that controller synthesis based on the separation principle can lead to degraded performance for transient energy growth suppression. Using a number of illustrative examples, we show that observer-based control strategies can be greatly improved by abandoning the separation principle.

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