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# Synchronization and antisynchronization protocol design of chaotic nonlinear gyros : An adaptive integral sliding mode approach (Article) (Open Access)

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## Abstract

View references (24)

A novel control protocol design , via integral sliding mode control with parameter update laws, for synchronization and desynchronization of a chaotic nonlinear gyro with unknown parameters is the focus of this work. The error dynamics of the actual system are substructured into nominal and uncertain parts to employ adaptive integral sliding mode (AISM) control. The uncertain parameters are estimated via devised adaptive laws. Then the disagreement dynamics are guided to origin via AISM control. The stabilizing controller is also designed in terms of nominal control along with a compensating component. The control and the parameter update laws are constructed to ensure the strictly negative derivative of a Lyapunov function. Graphical results related to synchronization , desynchronization, and chaos suppression are displayed to demonstrate the potential of the proposed control. © TÜBİTAK.

## SciVal Topic Prominence

Topic: Synchronization | Chaotic systems | Lag synchronization

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## Author keywords

Adaptive backstepping method | AISM control | Chaotic gyro | Desynchronization | Lyapunov function | Synchronization

## Indexed keywords

Engineering controlled terms: Gyroscopes | Lyapunov functions | Sliding mode control | Synchronization | Uncertainty analysis

Engineering uncontrolled terms: Adaptive back-stepping | Anti- synchronization | Chaotic gyros | Desynchronization | Integral sliding mode | Integral sliding mode control | Stabilizing controllers | Uncertain parameters

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