

# Derivative-Free Output Feedback Adaptive Control for Vehicles

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## Current models for adaptive control have low accuracy

Adaptive control is a method for controlling vehicles that is used when parameters are uncertain or are expected to change. Research in this area aims to reduce modeling error while maintaining robustness and improving performance. Output feedback adaptive controllers are specifically used when it is not possible to see the entire state of a process such as (insert example here). The current models on the market account for active control of noise, vibrations, flows, and combustion, but these processes tend to have low accuracy.

## New innovation improves adaptation while also having simpler architecture

Researchers at Georgia Institute of Technology have developed a new output feedback adaptive control architecture that is far less complex than existing architectures while also improving stabilization and adaptation. Specifically, this model generalizes the assumption of constant unknown ideal weights to the existence of time-varying weights. This adds memory to the adaptive law, which improves transient behavior while also maintaining adaptability.

This invention is an output feedback adaptive control model for vehicles designed to work in a system where parameters are unknown or may vary. The architecture of this novel method is simpler than others of its kind while also improving adaptive control stabilization and tracking performance.

## Summary Bullets

- New Derivative-Free Output Feedback Adaptive Control for Vehicles improves adaptive control stabilization and tracking performance while achieving a simpler architectural model.
- Innovation allows for faster adaptation and can be used for aircrafts, missiles, spacecrafts, industrial process, automotives, and airframes.
- Novel technology uses generalization of assumptions to reduce modeling error while maintaining robustness and improving performance.

## Solution Advantages

- Improves adaptive control stabilization and/or tracking performance
- Allows faster adaptation with smoother transient characteristics for cases with severe damage
- Architecture is simpler in form than other existing architectures for adaptive output feedback control system designs

#### Potential Commercial Applications

- Effective adaptive flight control of aircraft, missiles, and spacecraft
- Industrial process control
- Automotive engines
- Flexible airframes and flexible structures

#### Inventors

- Anthony Calise

#### IP Status

<p>The following patent application has published and additional international coverage is pending</p>:  
WO20120265367

#### Publications

[Derivative-free adaptive control](#), American Institute of Aeronautics and Astronautics, Inc. - 2023

#### Images

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