



National Aeronautics and  
Space Administration



## TECHNOLOGY SOLUTION

**Aerospace**

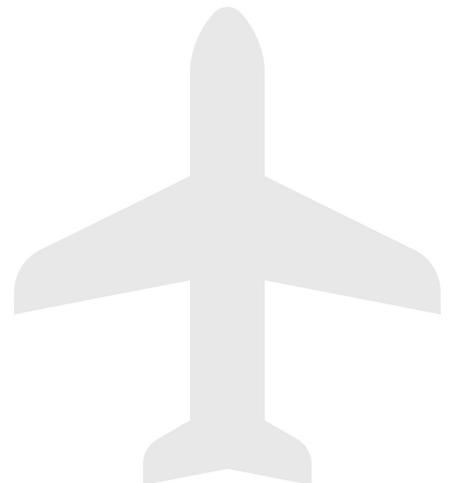
# Conditionally Active Min-Max Limit Regulators

*For faster engine response while ensuring engine safety*

The control system in modern commercial aircraft engines is designed to operate the engine in a safe manner throughout its operating envelope. In order to utilize the existing safety margins more effectively, Innovators at NASA's Glenn Research Center have developed a modification to current min-max engine control logic. This architecture is referred to as a conditionally active (CA) limit regulator. This concept uses the existing min-max architecture with the modification that limit regulators are active only when the operating point is close to a particular limit, improving engine response while preserving all necessary safety limits. An improvement in thrust response while maintaining all necessary safety limits was also demonstrated.

### **BENEFITS**

- More responsive: Improved transient response
- Less labor-intensive: Reduced time spent evaluating operational behavior
- More effective operation: Reduced conservatism in operational limits
- Better performance: Improved thrust while maintaining all safety limits



## THE TECHNOLOGY

Current aircraft engine control logic uses a min-max control selection structure to prevent the engine from exceeding any safety or operational limits during transients due to throttle commands. This structure is inherently conservative and produces transient responses that are slower than necessary. By activating the NASA Glenn's conditionally active limit regulators, engine response can be improved while preserving all necessary safety limits. An engine controller using CA limit regulators will get a faster engine response while ensuring engine safety. The improved performance is attained by eliminating unnecessary limit regulator activations and by utilizing more of the available safety margins.

This is an early-stage technology requiring additional development. Glenn welcomes co-development opportunities.



NASA Glenn's CA limit regulators improve engine response while preserving all necessary safety limits

## APPLICATIONS

The technology has several potential applications:

- Aerospace

## PUBLICATIONS

Patent No: 9625886

## More Information

National Aeronautics and Space Administration

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