



## Aeronautics

# Estimating perturbation level of scheduled aircraft arrival operations

## Estimate Perturbation Level in Scheduled Aircraft arrival Operations Using Schedule Non-conformance

The National Airspace System (NAS) is the collection of all the components (airspace, facilities, equipment, services, workforce, procedures, etc.) that enable the nation's air transportation system. NextGen, short for the Next Generation Air Transportation System, is a comprehensive transformation of the NAS, to a system that will be safer, more reliable and more efficient, and which will reduce the impact of aviation on the environment. The transition to NextGen is vital to improving system performance, meeting continued growth in air traffic, and increasing the Nation's mobility to support economic progress. To support the NextGen effort, research at NASA Ames Research Center tests the integration of many of NASA's technologies that aim to improve operations in the airspace immediately surrounding the airport, known as the terminal area. This innovation is one of the terminal area decision support technologies NASA is developing.

## BENEFITS

- Comprehensive and objective method to estimate the level of perturbation during scheduled aircraft arrival operations
- Determines nominal-perturbation threshold without disturbances
- Determines off-nominal perturbation
- Detection of recovery
- Assessment of operational resiliency
- Assessment of the impact of the level of perturbations on subjective controller workload and operational performance improving safety, capacity, efficiency and flexibility

technology solution



# NASA Technology Transfer Program

Bringing NASA Technology Down to Earth

## THE TECHNOLOGY

This innovation enables objective estimation of the level of perturbation during scheduled aircraft arrival operations. This technology helps in a) determination of nominal-perturbation threshold, which is determined by measuring perturbation levels during operations without disturbances; b) detection of off-nominal perturbation using the above threshold, and c) detection of recovery by monitoring the perturbation level. Recovery can be declared once the perturbation level becomes at or below the nominal threshold level. By applying this technology the following conceptual problems can be solved too: assessment of robustness of scheduled arrival operations, and assessment of resilience of scheduled arrival operations. Human-in-the-loop experiment data were used in the development of this innovation. NASA software is used to collect data. Matlab is used to implement the innovation and estimate the perturbation level, and to assess robustness and resilience.



One of the potential applications of this technology is for air traffic controllers and traffic managers.

## APPLICATIONS

The technology has several potential applications:

- Air traffic controllers and traffic managers
- Airline flight dispatch operations
- Aeronautics
- Method to assess robustness and resilience

## PUBLICATIONS

"Eleventh USA/Europe Air Traffic Management Research and Development Seminar (ATM2015) Assessing Resilience of Scheduled Performance-Based Navigation Arrival Operations."

National Aeronautics and Space Administration

**Technology Partnerships Office**

**Ames Research Center**

MS 202A-3

Moffett Field, CA 94035

1-855-627-2249

ARC-TechTransfer@mail.nasa.gov

<http://technology.nasa.gov/>

**www.nasa.gov**

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