2010 Highlights

NASA SimLabs News

Advanced Simulation Research at NASA Ames

The Simulation Laboratories (SimLabs) at NASA Ames include some of the most sophisticated simulation facilities in the world. We support a wide range of research, with emphasis on aerospace vehicles, aerospace systems and operations, human factors, and improving aviation safety.

Large Civil Tilt-Rotor (LCTR) Concept Development

A series of NASA/Army studies on the Vertical Motion Simulator (VMS) investigated flight dynamics and control requirements for a large tilt-rotor (similar in size to a Boeing 737) to identify unique handling qualities challenges and develop flight control design guidelines. The large motion capability of the VMS, with its realistic horizontal and vertical motion cues, directly contributed to identifying handling qualities issues. One test pilot stated it was the best flight simulator he had flown.

"Tilt-rotor aviation is going to revolutionize a lot of the things we do."

- NASA Administrator Charles Bolden, at the Green Aviation Summit

Cutting-Edge Technology in Air Traffic Management

NASA is developing an integrated Trajectory-Based Automation System (TBAS) that can enhance future air traffic safety and efficiency through intelligent automation tools to assist the air traffic controller. The flight and air traffic control simulators at SimLabs are linked to create interactive simulated air traffic scenarios to evaluate TBAS. A similar simulation environment is also used to develop, evaluate, and refine the Three-Dimensional Path Arrival Management concept that can significantly reduce fuel use, noise, and emissions on descent.

SimLabs: 2010 News Highlights


VMS: SHaQ

Vertical Motion Simulator (VMS)

The VMS provides researchers with exceptional tools to explore, define, and solve issues in both aircraft and spacecraft design.

Astronaut Training: Two NASA Space Shuttle astronaut training sessions were completed in Fiscal Year (FY) 2010 on the VMS. Thirty-two pilots and 19 mission specialists completed 438 training runs. This periodic training familiarizes Shuttle crews with vehicle handling during approach, landing, and rollout under normal operating conditions, as well as off-nominal and failure conditions.

SHaQ: Two NASA studies evaluated Spacecraft Handling Qualities (SHaQ), the first in nearly 40 years. Astronauts flew a new Velocity Increment control system that made the vehicle simpler to operate and less vulnerable to failures. Results are applicable to future piloted spacecraft with precision landing requirements, anticipated for a lunar base or other celestial body.

Crew-Vehicle Systems Research Facility (CVSRF)

The CVSRF houses two high-fidelity flight simulators and an air traffic control simulation laboratory capable of full-mission simulation.

TAPPR: Three Terminal Area Paired Procedures Research (TAPPR) experiments were conducted for NASA in FY 2010. Simulations were run in CVSRF's Advanced Concepts Flight Simulator, with experienced air traffic controllers and commercial airline crews as experimental participants. Work on these advanced tools and procedures will enable aircraft to fully utilize very closely spaced parallel runways under all weather conditions.


CVSRF: UAS

UAS: Real-time, distributed simulation experiments of Unmanned Aerial Systems (UAS) operating in the National Airspace System (NAS) were conducted at the CVSRF for the US Navy. The Live-Virtual-Constructive Distributed Environment project investigated methods to integrate the Navy's Broad Area Maritime Surveillance aircraft into the NAS.


FFC: LAX

FutureFlight Central (FFC)

The FFC simulation facility offers immersive 360-degree, full-scale, real-time simulation capability with a customizable, modular layout.

SARDA: Three Spot And Runway Departure Advisory (SARDA) airport surface scheduling simulations were completed for NASA in FY 2010 at FFC. The SARDA airport scheduling system includes a Runway Scheduler and Spot Release Planner. The scheduling algorithms are expected to enable more efficient taxi operations, reducing fuel burn, emissions, and delays on the airport surface.

LAX: Los Angeles World Airports utilized FFC for a major safety study of Los Angeles International Airport (LAX). An independent academic panel designed and reported on the results of the simulation study, evaluating the safety and efficiency of multiple North Airfield configurations. The study also investigated traffic levels and aircraft fleet mix expected in the future.

Visit www.simlabs.arc.nasa.gov for full articles.