NASA SimLabs News

Volume 7, Issue 2

http://www.simlabs.arc.nasa.gov

April 2007

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Welcome New Subscribers!
If you are receiving this newsletter for the first time, SimLabs News is a quarterly publication reviewing current projects at the NASA Ames Simulation Laboratories (SimLabs). NASA SimLabs is comprised of three unique Flight Simulators, an Air Traffic Control radar simulator and a high fidelity Air Traffic Control Tower simulator. The facilities support government as well as private industry in a wide array of applications. To find out more, read on!

1. Exploring Roles in Very Closely Spaced Runway Approaches

NASA Ames recently completed a research study in SimLabs' Crew Vehicle Systems Research Facility (CVSRF) in which procedures and displays were evaluated for very closely spaced runway approaches. The concept, called Terminal Area Capacity Enhancing Concept (TACEC) developed by Raytheon, supports the Airspace Systems Program within the Aeronautics Research Mission Directorate.

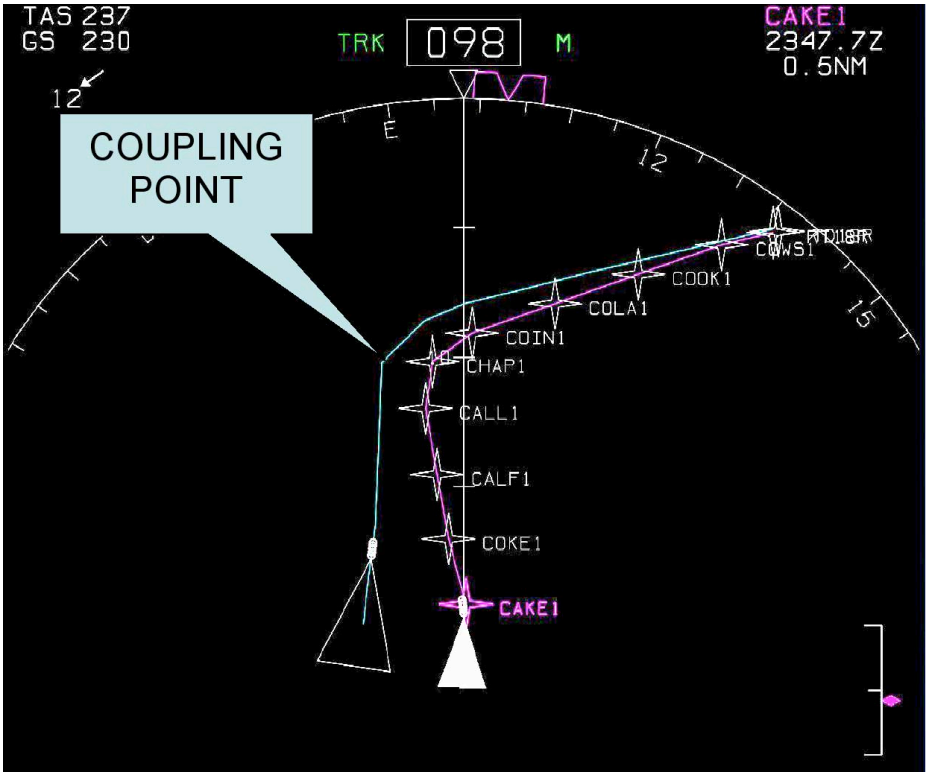

Figure 1. Navigational display for TACEC Experiment

Researchers used the Advanced Cockpit Flight Simulator (ACFS) to obtain pilot feedback on TACEC information requirements, changes in roles and responsibilities, and definition of procedures.

The approach scenarios consisted of a lead B757 aircraft, which was computer generated, and a follower B757 aircraft, which was represented by the ACFS. The approaches were flown to parallel runways that were 750 feet apart.

Enhanced displays in the cockpit provided pilots with the lead aircraft's position and speed via ADS-B, and wake information. They were also given a 4D trajectory to a coupling point, 12 nautical miles from touchdown.

Figure 2. Advanced Cockpit Flight Simulator (ACFS)

Pilots flew the approaches under eight different conditions, defined by two levels for each of the three variables – wind conditions, visibility conditions and spacing between the leader and follower. The wind conditions made the determination of wake characteristics more difficult. One scenario required a break out maneuver from the formation.

Researchers observed the pilots interacting with displays, and obtained their feedback on displays, information flow and breakout procedures. The pilots accepted the procedures better under clear visibility than in the Category IIIB conditions. They also preferred the greater spacing between the lead aircraft and follower aircraft (10 seconds versus 5 seconds). They did not have any preference for landing on the left or right runway. The data will be analyzed and reported in the coming weeks.

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2. FAA Investigates Standards for End Around Taxiways in SimLabs

Moving aircraft safely and efficiently on the ground is essential to increased capacity for the air transportation industry. End Around Taxiways (EATs) are a method to help in this endeavor. EATs are perimeter taxiways situated around the runway complex. The purpose is to avoid crossing traffic on active runways and expedite traffic.

In March 2007, the FAA conducted the third in a series of simulation studies to develop standards for the use of these new taxiways. Previous studies, also conducted at SimLabs, evaluated the pilot's ability to differentiate crossing traffic from end around traffic on departures.

The March simulation addressed pilot perception while over-flying aircraft on the new taxiways. Using NASA SimLabs' B747-400 simulator, commercial pilots from several airlines flew approaches that differed in visibility, lighting and amount of ground traffic on the end arounds.

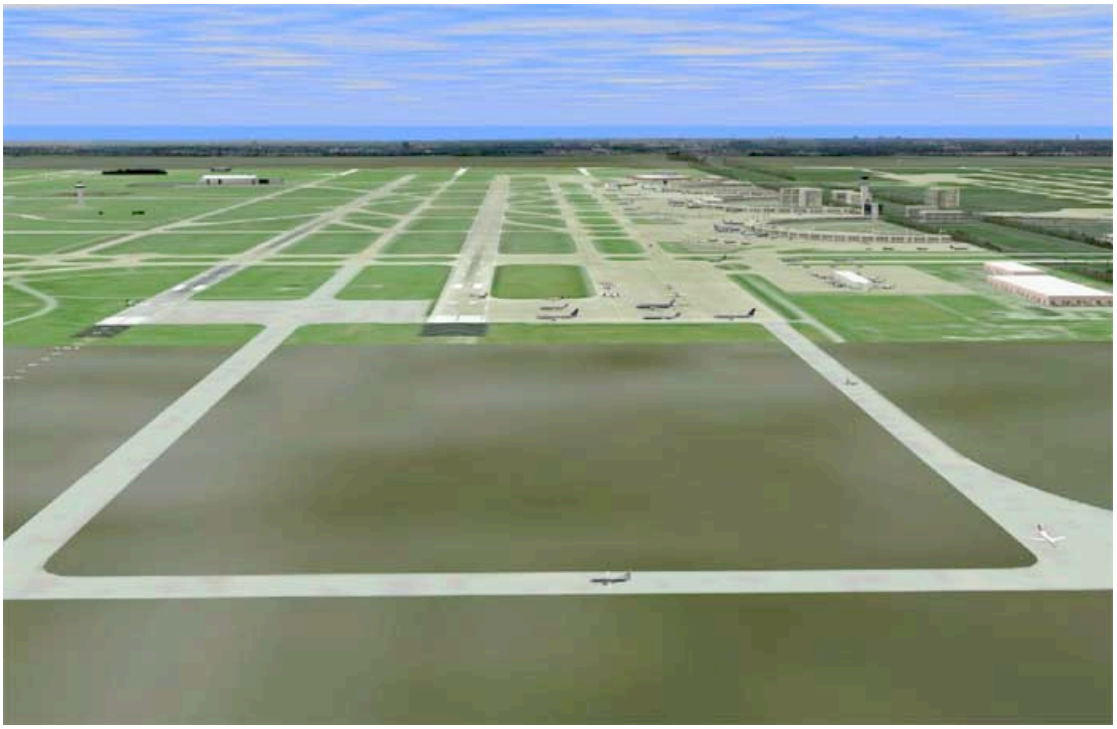

Figure 3. End around taxiways

The pilots filled out questionnaires after each approach and at the end of the session. Data on aircraft status and position as well as the ground traffic was also collected from the simulation. The FAA will evaluate the data and use the results in helping establish standards and procedures for EATs approaches to make air travel safer and more efficient.

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3. Vertical Motion Simulator Visual System Upgrade

NASA SimLabs has nearly completed a major upgrade to the Vertical Motion Simulator (VMS) flight simulator

visual systems. The system upgrade includes new image generators and display systems that will deliver orders of magnitude increases in the fidelity of out-the-window visual scenes. The new displays are Liquid Crystal on Silicon (LCOS) projectors which offer significant enhancements in contrast, resolution and brightness.

The image generator includes a database generation system that employs commercial-off-the-shelf tools such as Adobe Photoshop and MultiGen Creator, and outputs in both proprietary and Open Flight industry standard formats.

The new image generator has area-based, subpixel, full-screen anti-aliasing, for improved pilot cues and object recognition. NASA astronauts training in the VMS should notice a major improvement in the depiction of ground lights required by the Orbiter during night landings at Kennedy Space Center.

Two gigabytes of dedicated texture memory will provide very high resolution for VMS photo imagery-based databases. High fidelity weather and atmospheric effects, will provide more realistic multiple textured layered clouds and fog. Multiple Phong light sources will allow the VMS to represent light lobes, flares, specular highlights, and spotlights.

The first simulation to employ the new visual system will be the Lunar Lander Simulation Project.

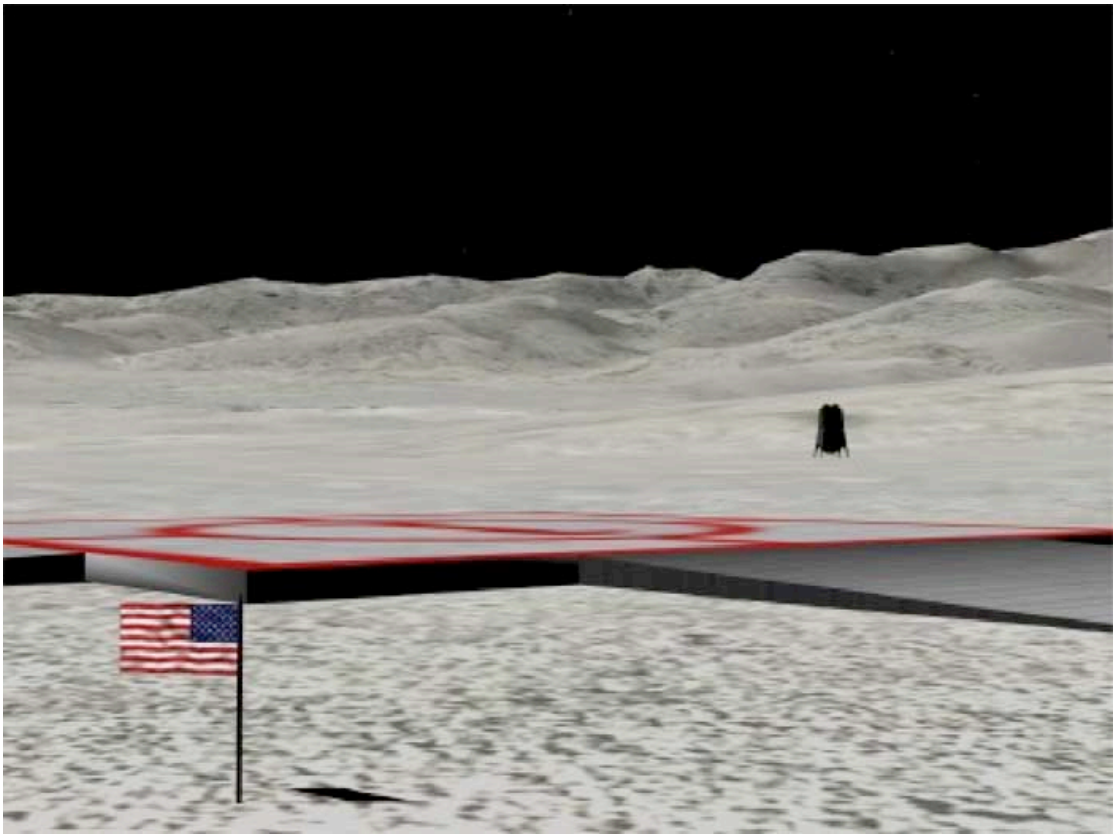

Figure 4. Lunar database at NASA SimLabs

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4. Thinking of Doing Business with NASA SimLabs?

For more information on what we can do for your needs, contact:

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