American
Physical
Society
One Physics Ellipse
College Park, MD 20740-3844
www.aps.org

****

Should Airplanes Look Like Birds?

Engineers in California and South Africa Envision More Fuel-Efficient Design
Presentation at Fluid Dynamics Meeting Today in Long Beach, CA

****

EMBARGOED for release until 12:30 p.m. Eastern time (U.S.) on Sunday, Nov. 21, 2010

Contact: Jason Socrates Bardi,
American Institute of Physics
301-209-3091, office
858-775-4080, cell
jbardi@aip.org

WASHINGTON, D.C., November 21, 2010 -- Airplanes do not look much like birds -- unless you were to imagine a really weird bird or a very strange plane -- but should they? This question is exactly what a pair of engineers in California and South Africa inadvertently answered recently when they set about re-thinking the ubiquitous tube-and-wings aircraft architecture from scratch in order to make airplanes more fuel efficient.

The modern airplane design works well, but from a fuel efficiency standpoint, could planes be designed more aerodynamically -- to lower drag and increase lift? Geoffrey Spedding, an engineer at the University of Southern California, and Joachim Huyssen at Northwest University in South Africa, felt they could in theory, but they lacked experimental evidence. Now they have it.

Spedding and Huyssen have made a simple modular aircraft in three configurations: a flying wing alone, then wings plus body, and then wings plus body and a tail. It turns out that they had independently re-designed a bird shape, but without specific reference to anything bird-like. They will present their experimental data with these three designs, today at the American Physical Society Division of Fluid Dynamics meeting in Long Beach, CA.

They started with a configuration where the entire plane is one big wing. Then they added a body designed to minimize drag and, most critically, a small tail, which essentially serves to undo aerodynamic disturbances created by the body. Spedding and Huyssen analyzed the airflows and at various relative angles for the wings, body and tail, searching for ways to achieve greater lift (the better for carrying cargo) and lower drag (for higher fuel

efficiency). They made the stipulation that for any given mission, the best plane is the one that generates the least drag.

The flying wings alone provide an ideal (but impractical) baseline, since it's hard to carry people or cargo in such a shape. The presence of a body, unfortunately, immediately lowers the lift and increases the drag. The addition of just the right kind of tail, however, can restore the lift, and reduce the drag, occasionally to nearly wing-only levels.

A few years ago a glider with the modest tail design was successfully test flown, but larger and commercial test prototypes have not yet been tried. Spedding recognizes that the design of real planes is necessarily a compromise of many engineering, economic and psychological constraints. Nevertheless, he believes much can be done to make planes more energy efficient in the future.

"The most important point is that we may be wasting large amounts of fossil fuel by flying in fundamentally sub-optimal aircraft designs," says Spedding. "At the very least, we can show that there exists an alternative design that is aerodynamically superior. One may argue that there is now an imperative to further explore this (and perhaps other) designs that could make a significant difference to our global energy consumption patterns."

The presentation, "Should planes look like birds?" is at 9:18 a.m. on Sunday, November 21, 2010 in the Hyatt Regency Long Beach Room: Regency D. ABSTRACT: http://meetings.aps.org/Meeting/DFD10/Event/132371

IMAGES: Two images may be obtained by emailing jbardi@aip.org

****

MORE MEETING INFORMATION

The 63rd Annual DFD Meeting is hosted this year by the University of Southern California, California State University Long Beach, California Institute of Technology, and the University of California, Los Angeles.

It will be held at the Long Beach Convention Center, located in downtown Long Beach, California. All meeting information, including directions to the Convention Center is at: http://www.dfd2010.caltech.edu/

USEFUL LINKS

Main meeting Web site: http://www.dfd2010.caltech.edu/
Search Abstracts: http://meetings.aps.org/Meeting/DFD10/SearchAbstract
Directions to Convention Center: http://www.longbeachcc.com/

PRESS REGISTRATION

Credentialed full-time journalist and professional freelance journalists working on assignment for major publications or media outlets are invited to attend the conference free of charge. If you are a reporter and would like to attend, please contact Jason Bardi (jbardi@aip.org, 301-209-3091).

ONSITE WORKSPACE FOR REPORTERS
A reserved workspace with wireless internet connections will be available for use by reporters in the Promenade Ballroom of the Long Beach Convention Center on Sunday, Nov. 21 and Monday, Nov. 22 from 8:00 a.m. to 5:00 p.m. and on Tuesday, Nov. 23 from 8:00 a.m. to noon. Press announcements and other news will be available in the Virtual Press Room (see below).

VIRTUAL PRESS ROOM
The APS Division of Fluid Dynamics Virtual Press Room will be launched in mid-November and will contain dozens of story tips on some of the most interesting results at the meeting as well as stunning graphics and videos. The Virtual Press Room will serve as starting points for journalists who are interested in covering the meeting but cannot attend in person. See: http://www.aps.org/units/dfd/pressroom/index.cfm

GALLERY OF FLUID MOTION
Every year, the APS Division of Fluid Dynamics hosts posters and videos that show stunning images and graphics from either computational or experimental studies of flow phenomena. The outstanding entries, selected by a panel of referees for artistic content, originality and ability to convey information, will be honored during the meeting, placed on display at the Annual APS Meeting in March of 2011, and will appear in the annual Gallery of Fluid Motion article in the September 2011 issue of the American Institute of Physics' journal, Physics of Fluids.

This year, selected entries from the 28th Annual Gallery of Fluid Motion will be hosted as part of the Fluid Dynamics Virtual Press Room. In mid-November, when the Virtual Press Room is launched, another announcement will be sent out.

****
ABOUT THE APS DIVISION OF FLUID DYNAMICS
The Division of Fluid Dynamics of the American Physical Society (APS) exists for the advancement and diffusion of knowledge of the physics of fluids with special emphasis on the dynamical theories of the liquid, plastic and gaseous states of matter under all conditions of temperature and pressure. See: http://www.aps.org/units/dfd/

####