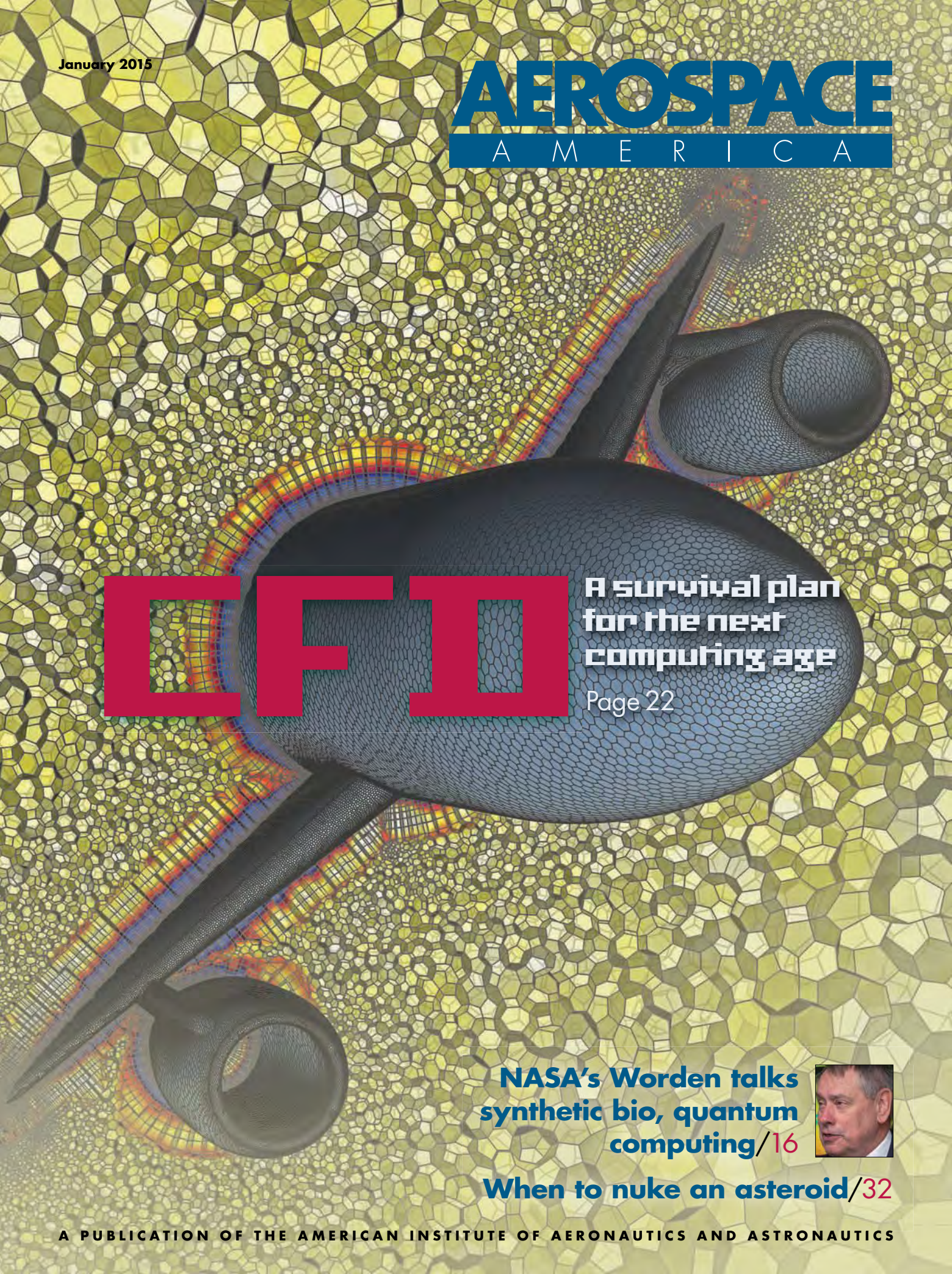
January 2015

AEROSPACE AMERICA



CFD

A survival plan for the next computing age

Page 22

NASA's Worden talks synthetic bio, quantum computing/16

When to nuke an asteroid/32

A PUBLICATION OF THE AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS

Why rocketeers fear wind

On the Beaufort scale a 20 knot wind is termed a "fresh breeze" and is welcome relief on a hot day, but not on launch day, as the Orion team twice found out before seeing their handiwork lift off on Dec. 5. A day earlier, automatic sensors detected wind speeds climbing to over 20 knots, triggering automatic holds in the launch sequence. The launch was ultimately scuttled due to what NASA called a "sticky" valve on the Delta 4 rocket. But the wind delays raised the question: Why does wind matter to a rocket that weighs nearly 500,000 pounds and generates over 700,000 pounds of thrust?

Moving-air currents affect rockets like they do airplanes. Strong winds can buffet them, slide them off course, and generally make the control systems work twice as hard to keep the craft on its intended track. There is also a slight risk of a wind gust moving the rocket into the launch tower itself — damaging both the craft and the tower — making launch impossible.

Once the rocket is aloft, wind gusts can overcome the ability of its hydraulic engine gimbals to keep the rocket on course, changing the ascent trajectory from a safe one tracking over largely unpopulated areas to "a much more risky, unintended, track over heavily populated areas which would be endangered by a launch abort scenario, or a debris fall," said Christopher Goyne, associate professor of mechanical and aerospace engineering at the University of Virginia. "High winds can also lead to forces and vibrations that can structurally destroy a rocket while it is on the launch pad."

Former NASA astronaut Wally Schirra discussed such a scenario in a 2002 interview with author Francis French, revealing that Apollo 7 launched in wind conditions that threatened to blow the craft "back over the beach," potentially creating havoc.

Wind was discussed as a potential contributor to the fatal 1986 explosion of the shuttle Challenger. While the cause of the disaster was found to be a faulty O-ring seal, the official report noted that "thrust vectoring and normal vehicle response to wind shear" could have "magnified the leakage from a degraded seal in the period preceding the observed flames."

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A Delta 5 with NASA's Orion crew capsule mounted atop lifts off from Cape Canaveral Air Force Station in Florida Dec. 5, one day after the original planned launch was postponed because of high winds.