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Lidar air data measurement

Airspeed probe for helicopters

An air data lidar is well suited to the direct measurement of airspeeds on helicopters, since it takes measurements away from rotor turbulence.

ONERA
THE FRENCH AEROSPACE LAB

An air data lidar used for airborne measurement tests

Lidar air data measurement

Lidar-based air data measurement calls on the Doppler effect. By measuring the difference in frequency between a wave emitted by a laser and the same wave reflected back by natural aerosols in the atmosphere, we can directly measure airspeed at the point of measurement.

This technique ensures very good accuracy, and it does not depend on the aircraft's own speed. Measurements are reliable throughout the flight envelope, including at speeds of near zero, in backward flight and in all directions.

Applications

Innovative new solutions in fiber-optic laser sources operating at 1.5 µm pave the way for the development of a multifunction lidar ("light radar") sensor that combines airspeed measurement (air data mode), range measurement and target speed. These solutions can be used on civil or military aircraft.

Airspeed measurement

- Low-speed air data measurement (flight control, steep approaches)
- Wind measurements (preparations for hovering)
- Flight envelope protection (all-weather flight), wake vortex detection
- Offshore approaches

The 4-axis of the lidar optical head

Measurement of distance from obstacles and relative speed

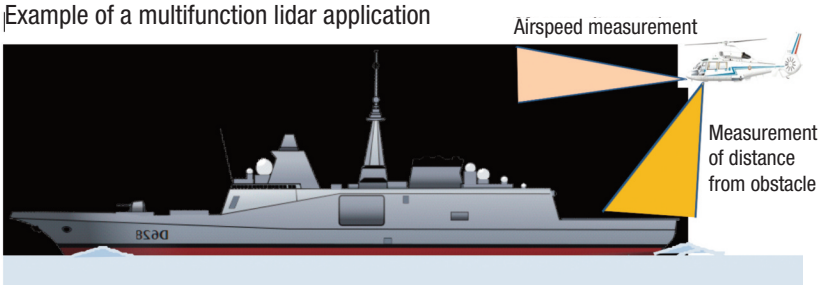
- Securing the landing point
- Security zone (detection, formation flight)
- Automatic deck landing
- Obstacle detection

Advantages

ONERA offers two major advantages in terms of lidar development:

- Long experience in the development of fiber-source lidars and applications, to easily offer multifunction solutions.
- A dedicated research team tasked with improving the performance of laser sources for use in lidars.

Example of a multifunction lidar application



La recherche CARNOT pour les entreprises

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