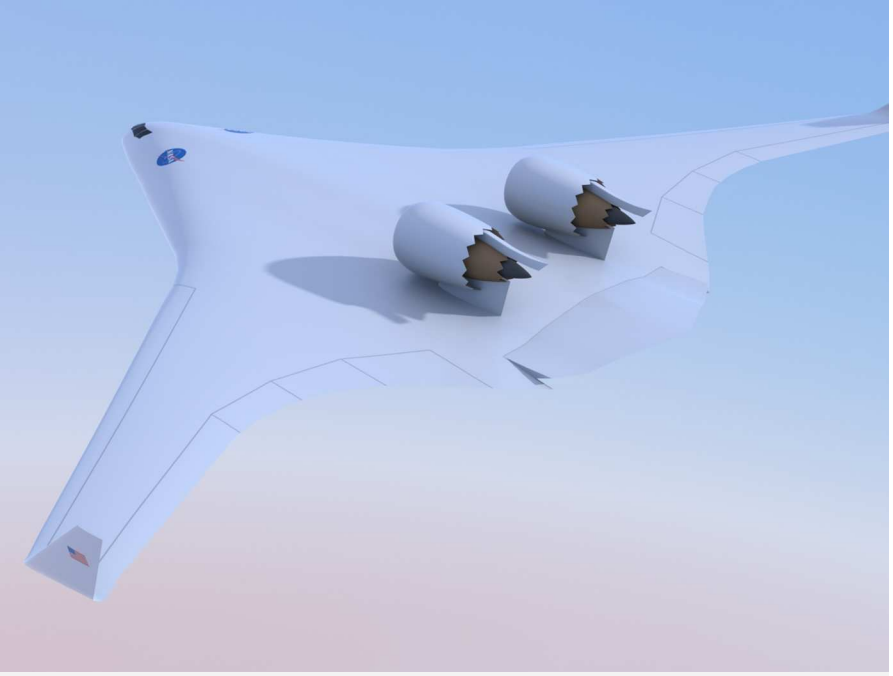

National Aeronautics and Space Administration

Aeronautics

Aircraft Jet Exhaust Noise Reduction

Jet noise reduction system for aircraft with engines mounted above wing, tail, or fuselage

A system of nozzles and pylons that redistributes jet exhaust noise sources upstream to reduce jet noise has been developed. Certain aircraft configurations install the propulsion engines above the wing or tail surfaces or above the fuselage or in some cases above the structure that is a blend of the wing and body or hybrid wing body aircraft. In these aircraft configurations, reducing noise propagation to the community below is possible by using the aircraft as an acoustic shield for the sources associated with the engine. The more difficult engine noises to shield are from the jet exhaust because they are typically distributed downstream, the equivalent of several engine nozzle diameters. This innovation redistributes jet exhaust upstream to reduce noise.

BENEFITS

- Reduced jet exhaust noise
- Uses practical components
- Increases the total noise reduction both by reduction at the jet noise source and by increasing the amount of noise reduction obtained by the shielding airframe (increases the effectiveness of a given shield area)

APPLICATIONS

- Aircraft where engines are installed above the wing, tail, or fuselage

technology solution

THE TECHNOLOGY

The objective is to acoustically shield the noise radiated by the exhaust jet to the community below. The first embodiment is to add an external pylon structure common on engine-under-the-wing installations to the nozzle which also structurally holds the engine to the airframe (as pictured in cover photo). The second embodiment adds to the configuration of the first embodiment nozzle chevrons on the fan nozzle, on the core nozzle, or both. The chevrons can be of either circumferentially uniform design or azimuthally varying design with the chevrons of greater size and flow immersion on the side of the nozzle adjacent to the pylon. The third embodiment has two pylon structures 180 degrees apart from each other, one structurally connecting the engine to the airframe (the keel position) but of a design that produces a weak acoustic pylon effect and the pylon on the opposite side from the airframe (the crown position) structure is of the design that produces a strong acoustic pylon effect. There can be several variations of this embodiment using round nozzles, circumferentially uniform chevron nozzles, or with azimuthally varying chevrons with the chevrons of greater size and flow immersion adjacent to the pylon that produces the strong acoustic effect.

Model scale hardware showing one embodiment of invention

PUBLICATIONS

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More Information

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