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Title
Cavity noise reduction with sweeping actuators

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Abstract
Cavity noise is a significant problem in the aviation industry, particularly in the design and operation of aircraft. Cavity noise occurs when airflow separates from a surface and creates vortices within a cavity, which then generate noise. In the case of airplanes, the cavity noise is typically generated in areas such as the landing gear bays, engine nacelles, and wing flaps. This noise can be not only annoying and uncomfortable for passengers and crew, but it can also affect the structural integrity of the aircraft. Furthermore, noise pollution is a major concern for communities surrounding airports, and the reduction of cavity noise is an important factor in mitigating this issue. Therefore, the need for effective cavity noise control solutions is crucial for the aviation industry.

Sweeping jet actuators (SJAs), [1] have shown great potential as a solution to reducing cavity noise in the aviation industry. SJAs are devices that emit high-speed jets of air that sweeps back and forth across the surface at a high frequency, to control and manipulate the airflow around an object. In the context of cavity noise reduction, SJAs can be used to prevent the formation of vortices within a cavity by controlling the airflow and reducing turbulence.

The trailing edge of the cavity is a particularly important location for SJA application as it is where the flow separation occurs and generates most of the noise. By applying SJAs at the trailing edge, the turbulent flow can be controlled, and the noise generated by the cavity can be reduced. Sweeping jet actuators have shown great potential as a solution to cavity noise reduction, particularly in the trailing edge of the cavity [2]. Their ability to control turbulence and reduce noise across a range of Mach numbers makes them a versatile and effective solution to this challenging problem. With further research and development, SJAs may become a standard feature in the design of aircraft and other vehicles, providing a quieter and more comfortable environment for passengers and crew.

References

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