Journal of Acoustical Engineering Society of Iran, Vol. 11, No. 1, 2023

(Research Article)
Experimental investigation of the surface pressure spectrum on a high-swept-back delta wing

J. Ragani Lamouki[1], A. Afshari[2], M. Pasandidehfard[*1]
1. Department of Mechanical Engineering, Ferdowsi University of Mashhad
2. Department of Aerospace Engineering, Shahid Sattari Aeronautical University of Science and Technology

Received: 2023/04/08, Accepted: 2023/09/02

Abstract

In recent years, the delta wing configuration has been widely used in subsonic drones in addition to supersonic aircrafts such as fighters. On the other hand, due to the increasing development of acoustic detection systems, it is necessary to investigate the noise of drones. In this article, the behavior of surface pressure fluctuations as a source of noise generation on a delta wing with a 70-degree sweep angle has been investigated experimentally. The obtained results show that at angles of attack above 5 degrees, there was a significant increase in the surface power spectral density values, which could be caused by the formation of leading-edge vertices at the end of the wing. Also, by moving in the direction of the flow, while transferring energy from high frequencies to lower frequencies, the peak of the surface pressure spectrum occurs at lower frequencies. Finally, the obtained results show that at an angle of attack of 30 degrees, there was a significant increase in the surface power spectral density values in the position close to the trailing edge of the wing, which indicates the occurrence of the vortex bursting phenomenon at that position.

Keywords: Delta wing, Leading edge vortex, Noise, Surface pressure spectrum.

pp. 48-58 (In Persian)

[*] Corresponding author E-mail: fard_m@um.ac.ir