Investigation on Nacelle Liner Drag and Acoustic Performance

LI Xiaodong, CHEN Chao, LIU Yin，ZHENG, Mingyang
Beihang University，XueYuan Road No.37, Beijing, 100191 China
THIELE, Frank
CFD Software Entwicklungs- und Forschungsgesellschaft mbH, Berlin, 14163, Germany

ABSTRACT

Acoustic liner is one of the most important passive noise control techniques for aero-engine noise suppression. So far, most of research on liner has been focused on the improvement of acoustic absorption performance. However, its negative impact to aerodynamic performance is usually neglected. It is highly desirable to invoke a breakthrough on low drag liner design technique which could yield wider application in future aero-engine and airframe low noise design. This study conducted the drag generation mechanism and acoustic performance of acoustic liners with different configurations in the presence of grazing mean flow and high incident sound intensities by numerical simulation and experimental measurement. A drag balance is designed to measure the liner drag in the Beihang University grazing flow impedance tube (BGFIT). An in-house DNS solver is to be employed for the numerical simulation in the conjunction with a highly accurate computational aeroacoustics (CAA) approach. Through insightful analysis of investigation results from highly accurate numerical simulation and experiments, the underlying mechanism of drag generation and acoustic absorption of liners is anticipated to be uncovered and illustrated.

Keywords： Acoustic Liner, Flow Drag, Absorption Mechanism, Computational Aeroacoustics