

Recent Research in the field of Aircraft noise and vibration control

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Abstract

The increasing public demand for more safety and comfortable air transportation and seamless travel has pushed aviation industry to a new stage. It is foreseen that the aviation will keep grow, and will somehow increase the pace of social interactions in the future. Yet still, it also has brought a serious consideration on air vehicles reliability particularly for aircraft structural integrity under various loads and environmental factors, lifespan reliability and maintainability, etc. As well as the environmental impact particularly for the nuisance caused by noise in the airport surrounding and resident area that flight route covers, the acoustic quality and harshness inside cabin environment, etc. Both considerations in turn have motivated industry and research institutes giving more and more concerns and resources to breed innovative solutions.

From technical point of view, within the past decades, there have been numerous technical routines and particular solutions to address the need for safety and comfortable aviation, and many of them have been implemented in today's main aircraft in services. Beside the state of art, there are several other distinctive demands from wide body long-range aircraft and smaller sized aircraft/rotorcraft in general aviation, especially in conjunction with the considerations of weight reduction, fuel and space efficiency.

This paper summarizes the recent research progress of aircraft acoustic and vibration control, especially those aims for future application in long-range wide body aircraft and general aviation. For instance, recent project in developing nacelle acoustic liner, engine vibration isolation, airfoil optimization for propeller noise reduction, self-adoptive vibration control and active noise control for cabin application.

Key words: aircraft, noise and vibration control

Biography



YAN Qun, senior engineer, director of aero engine research department. Currently focus on research and development of engine noise simulation, measurement and reduction techniques, as well as engine structural integrity research topics.

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Prof. HUANG Wenchao was the vice chief engineer of the Aircraft Strength Research Institute (ASRI) of China, also the director of department of aero engine structural strength and integrity. He has been conducting research of aircraft noise and its control, aircraft structure sonic fatigue test and analysis, and vibration environment test and vibration control for years. He was appointed as the director of Key Laboratory of Aeronautical Acoustics and Dynamics since the year of 2010.

近期飞机噪声与振动控制研究进展

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摘要

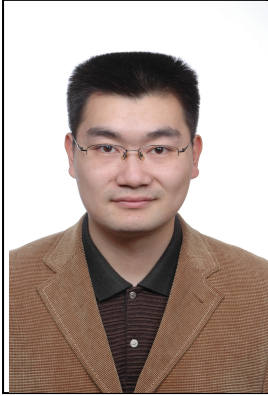
近年来随着经济的提升, 公众对未来安全、舒适的航空运输和无缝旅行的需求不断增加, 这势必会推动航空业进入一个新的阶段。可以预见的是, 航空业将保持增长, 并将不断加快未来社会交往互动的节奏。然而, 这也对飞行器的可靠性和舒适性提出了更高的要求, 特别是飞行器在多种载荷与环境因素下的结构完整性, 长期使用中的寿命与可靠性等; 以及飞机对舱内外环境的影响, 例如机场周围噪声扰民和舱内声质量问题等等。这些需求都不断的促使工业界和科研院所给予越来越多的关注和资源, 不断提出创新的解决方案。

从技术的角度来看, 在过去的几十年里, 针对飞机安全性和舒适性的需求已经发展出了许多技术和方案, 其中许多已经应用在了目前服役的飞机当中。以当前的技术水平作为基准, 针对宽体远程飞机和小型通用航空飞机/直升机的需求, 还应当有针对性地进一步发展能够减重, 提升燃油和空间效率的安全性及舒适性技术。

本文综述了近年来有关飞机噪声和振动控制方面的研究进展, 特别针对宽体远程飞机和小型通用航空飞机/直升机的应用提出了合作建议, 其中包括短舱声学衬垫, 发动机隔振安装, 螺旋桨翼型低噪声优化, 以及自适应振动控制和舱内主动噪声控制等。

关键词: 飞行器, 噪声与振动控制

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