



航空学报 » 1994, Vol. 15 » Issue (6) :725-730 DOI:

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旋翼BVI噪声的理论模拟与分析

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THEORETICAL STUDY ON THE BLADE-VORTEX INTERACTION NOISE OF HELICOPTER ROTOR

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摘要

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摘要 B V I 噪声是旋翼产生的一种非常强烈的脉冲式噪声,本文应用理论模拟的方法分析了 B V I 噪声的规律。对叶片表面非定常力的计算采用了有限翼展叶片对倾斜正弦式阵风的响应函数,声场计算应用了基于 L i g h t h i l l 声类比理论的频域方法。应用本文方法计算的 B V I 噪声声压信号与实验结果比较吻合较好。

关键词: 噪音 旋翼 涡桨—干涉

Abstract: The impulsive sound due to blade-vortex interaction of the helicopter rotor is discussed. First of all, the mechanism of such blade-vortex interaction is presented. Then, a theoretical model for the blade transient force and the radiated sound is given. The unsteady lift on the blade is calculated using the response function of a finite aspect ratio wing to an oblique gust obtained by linear unsteady aerodynamics. The sound harmonic formulation developed by L o w s o n is used for radiated sound due to the transient lift fluctuation. Finally, some numerical results are given to analyse the characteristics of helicopter noise due to blade-vortex interaction. The estimated transient sound pressure signal results show their reasonable agreement with the experimental data.

Keywords: noise (sound) rotary wings blade-vortex interaction

Received 1992-12-15; published 1994-06-25

引用本文:

乔渭阳, 唐狄毅, 李文兰. 旋翼BVI噪声的理论模拟与分析[J]. 航空学报, 1994, 15(6): 725-730.

Qiao Weiyang; Tang Diyi; Li Wenlan. THEORETICAL STUDY ON THE BLADE-VORTEX INTERACTION NOISE OF HELICOPTER ROTOR[J]. Acta Aeronautica et Astronautica Sinica, 1994, 15(6): 725-730.

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