



航空学报 » 2006, Vol. 27 » Issue (6) : 1130-1134 DOI:

论文

最新目录 | 下期目录 | 过刊浏览 | 高级检索

<< Previous Articles | Next Articles >>

考虑剪切和翘曲影响的直升机旋翼气弹稳定性分析

尹维龙, 向锦武

北京航空航天大学 航空科学与工程学院, 北京 100083

Aeroelastic Stability for Helicopter Rotor Blades with Consideration of Transverse Shear Deformation and Warping

YIN Wei-long, XIANG Jin-wu

School of Aeronautical Science and Engineering, Beijing University of Aeronautics and Astronautics, Beijing 100083, China

摘要

参考文献

相关文章

Download: PDF (513KB) HTML 0KB Export: BibTeX or EndNote (RIS) Supporting Info

摘要 在中等变形梁理论的基础上,对桨叶变形体进行有限变形分析,推导出同时考虑剪切和翘曲影响的小应变、中等变形梁应变-位移关系,并构造出一个全新的21自由度梁单元,应用Hamilton原理导出桨叶运动的有限元方程。在此基础上,研究了剪切和翘曲等非经典因素对无铰旋翼桨叶的动特性和悬停时气弹稳定性的影响。数值结果表明:剪切和翘曲对旋转桨叶的固有频率,尤其是高阶频率,有一定的影响,特别是随着转速的提高这种影响会变大;同时对悬停时桨叶的气弹稳定性有相当程度的影响,尤其是在高桨距角下这种影响是不能忽略的。

关键词: 直升机 桨叶 气弹 剪切 翘曲

Abstract: The aeroelastic stability behavior of a helicopter rotor blade in hover with transverse shear deformation and warping is investigated by using the finite element method in this paper. A 21-DOF beam finite element, including transverse shear DOF and warping DOF, is developed for analysis. The governing differential equations of motion for hingeless rotor can be derived using the Hamilton's principle. Numerical simulations are carried out to validate the current analysis of other literature. The influences of transverse shear deformation and warping on the natural frequencies and aeroelastic behavior of soft-in-plane hingeless rotor blade are investigated. With the inclusion of transverse shear and warping, there is a decrease in the rotation natural frequencies. It is also seen that the transverse shear deformation and warping have effects on the aeroelastic stability of the rotor blade. These effects become larger at the higher thrust level.

Keywords: helicopter blade aeroelasticity transverse shear warping

Received 2005-07-28; published 2006-12-25

引用本文:

尹维龙;向锦武. 考虑剪切和翘曲影响的直升机旋翼气弹稳定性分析[J]. 航空学报, 2006, 27(6): 1130-1134.

YIN Wei-long; XIANG Jin-wu. Aeroelastic Stability for Helicopter Rotor Blades with Consideration of Transverse Shear Deformation and Warping[J]. Acta Aeronautica et Astronautica Sinica, 2006, 27(6): 1130-1134.

Service

- ▶ 把本文推荐给朋友
- ▶ 加入我的书架
- ▶ 加入引用管理器
- ▶ Email Alert
- ▶ RSS

作者相关文章

- ▶ 尹维龙
- ▶ 向锦武