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带受控振荡附翼的新概念旋翼气动弹性分析

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AEROELASTIC ANALYSIS OF NEW CONCEPT ROTOR BLADE WITH CONTROLLED OSCILLATING TRAILING EDGE FLAP

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摘要

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摘要 通过建立带受控振荡附翼的新概念旋翼气动弹性分析模型,研究了采用受控振荡附翼的直升机旋翼气动弹性特性及其在降低旋翼振动载荷方面的有效性。气动模型采用了计及振荡附翼非定常影响的二元叶素模型。探讨了改变旋翼桨叶及振荡附翼的结构参数对新概念旋翼减振效果的影响。数值结果表明振荡附翼的引入能有效地降低旋翼桨毂的振动载荷。为振荡附翼的振动自适应控制律设计提供了有效的旋翼气动弹性分析方法。

关键词: 直升机 旋翼 气动弹性 附翼 振动

Abstract: The aeroelastic analysis of a helicopter rotor blade with the controlled oscillating trailing edge flap is presented by building an aeroelastic model of the new concept rotor blade. The aerodynamic model with unsteady terms including the effect of the trailing edge flap has been used. The sensitivity of structural parameters of the trailing edge flap on vibration reduction is also studied. Numerical results show that significant reductions of vibratory vertical shears and hub moments in the fixed frame can be obtained for a four bladed soft inplane hingeless rotor.

Keywords: helicop ter ro to r aeroelast icity flap vibrat ion

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