



航空学报 » 2006, Vol. 27 » Issue (6) :1080-1083 DOI:

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航空发动机管路支撑用钢丝绳隔振器仿真研究

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Simulation Research on Wire-Rope Isolator Applied to Aeroengine Pipe-Support

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摘要

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摘要 通过钢丝绳材料非线性研究,用弹性塑性硬化材料模型来描述钢丝绳的本构关系。以有限元理论为基础,建立钢丝绳隔振器的有限元模型,利用有限元分析软件ANSYS进行钢丝绳隔振器的性能仿真。由仿真结果可以看出,钢丝绳隔振器具有强烈的非线性滞迟特性和刚度软化特性,同时具有大阻尼特性,并且在大变形幅值下也能保持较好的阻尼性能。通过与实验研究结果对比,验证了仿真结果的正确性,从而为钢丝绳类干摩擦阻尼隔振器有限元仿真分析奠定了良好的基础。

关键词: 钢丝绳隔振器 管路支撑 有限元 仿真

Abstract: This paper describes the constitutive relation of wire-rope isolator with the elastic-plastic material model from the research on the nonlinear characters of wire-rope. The wire-rope isolator model is built on the base of the finite element theory. After that, the wire-rope performance is simulated by means of the software ANSYS. The simulative results, show that the wire-rope has strong nonlinear hysteresis, intenerated rigidity, and high damping capability which can be kept even on the big deformation condition. The experimental research results are contrasted with the simulative ones, which verifies well the simulation and establishes good base for analyzing wire-rope isolator.

Keywords: wire-rope isolator pipe-support finite element simulation

Received 2005-07-04; published 2006-12-25

引用本文:

闫辉;姜洪源;李瑰贤;崔虎. 航空发动机管路支撑用钢丝绳隔振器仿真研究[J]. 航空学报, 2006, 27(6): 1080-1083.

YAN Hui;JIANG Hong-yuan;LI Gui-xian;CUI Hu. Simulation Research on Wire-Rope Isolator Applied to Aeroengine Pipe-Support[J]. Acta Aeronautica et Astronautica Sinica, 2006, 27(6): 1080-1083.

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